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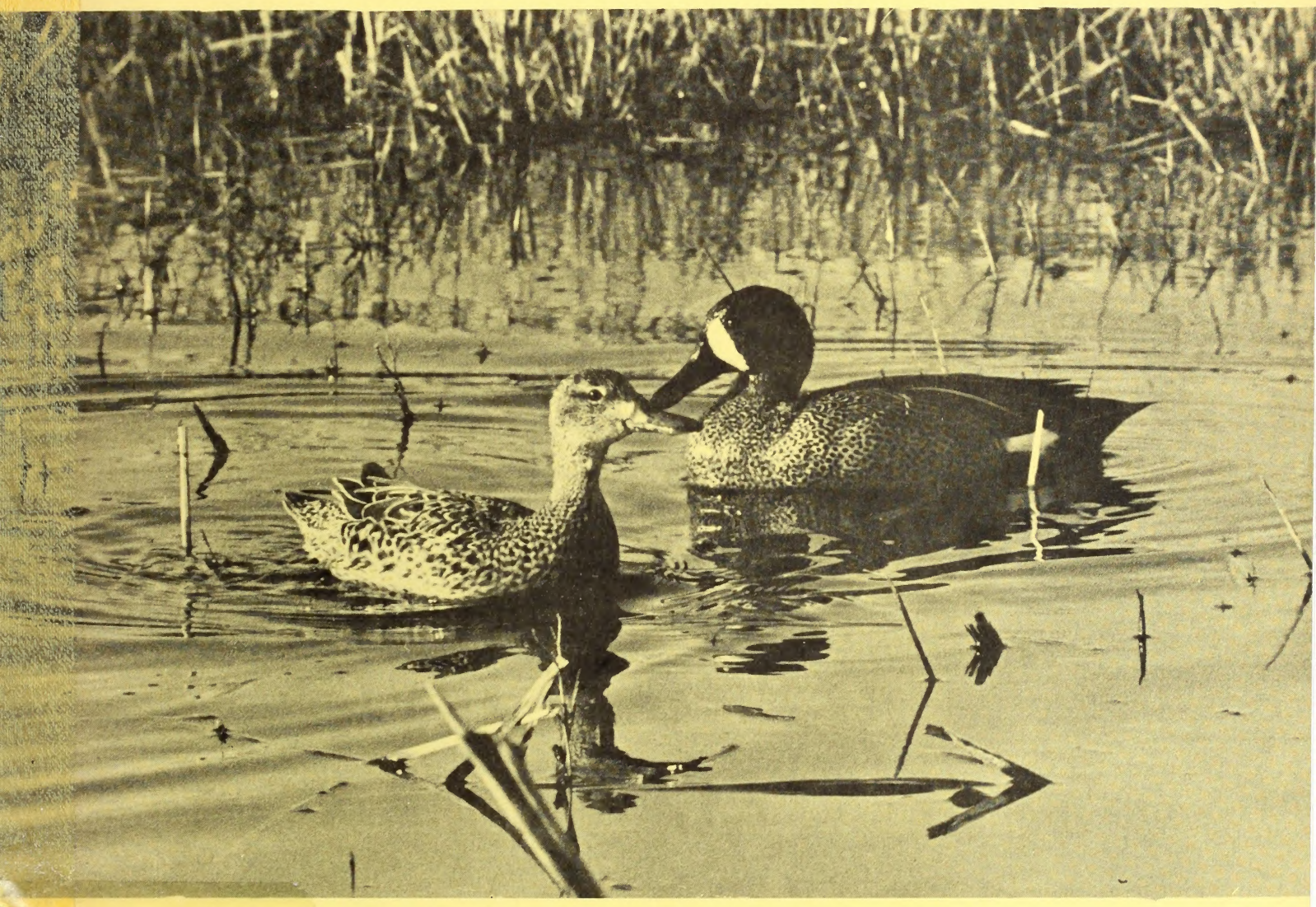
WIBAUX-BEACH WILDLIFE BASELINE STUDY - GAME SPECIES



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INTRODUCTION

The Bureau of Land Management (BLM), as a multiple use agency of the federal government, is mandated with the responsibility of managing the public surface and/or subsurface resource values (i.e., range, wildlife, watershed, soil, coal, oil and gas, etc.). Also, as the mineral leasing arm of the federal government, the BLM is charged with protecting, or reclaiming, surface resource values on privately owned lands overlying federal mineral deposits.

Large lignite and sub-bituminous coal fields underlie much of the surface of eastern Montana and western North Dakota. A large portion of this mineral acreage is owned by the federal government, even though much of the surface land is privately owned. All, or portions, of some of these coal reserves have been tentatively mapped and evaluated, and legally designated as Known Recoverable Coal Resource Areas (KRCRA's). One such designated coal reserve in the region is the Wibaux-Beach KRCRA (see Map 1). In 1976, several tracts of federal coal within that KRCRA were nominated for coal leasing.

The Wibaux-Beach KRCRA encompasses approximately 124,048 surface acres and the federal government owns roughly 40,935 acres (33%) of the subsurface coal mineral estate. The remaining subsurface estate, and all of the surface estate, is either privately owned or owned by the states of Montana and North Dakota.

Since none of the surface lands in the Wibaux-Beach KRCRA are administered by the federal government, the BLM had not previously developed any information on the surface resource values. Due to the high leasing interest and the relative lack of wildlife information, the BLM initiated an intensive wildlife inventory on a 258 sq. mile area in the Wibaux-Beach coal field in 1977 (see Map 1). This report is a discussion of the game species -- mule deer, whitetailed deer, antelope, ringnecked pheasant, sharptailed grouse, Hungarian partridge, turkeys and waterfowl, as well as the following species -- beaver, raptors, colonial nesting birds (cranes, cormorant, heron), and prairie dogs thought to occur in the Wibaux-Beach vicinity.

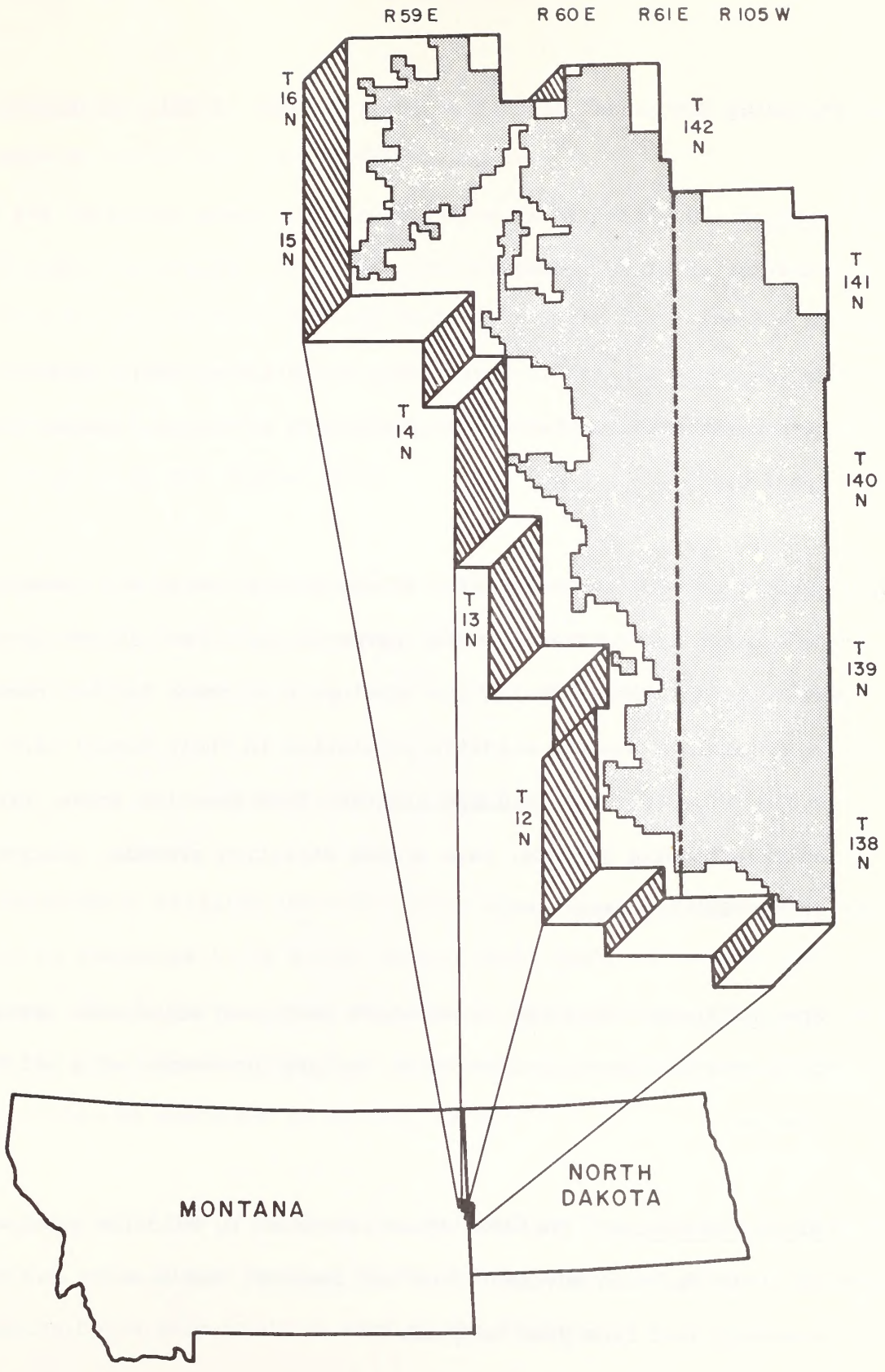
The objectives of the study were to:

1. Identify and document the occurrence and distribution in the area of the wildlife species listed.

2. Identify and document seasonal use areas, crucial areas, endangered species habitat, migration routes, introduction or reintroduction areas for the species discussed.

3. Identify and document significant habitat problems, limiting factors, conflicts and the existing status of the habitat in the area.

4. Identify and document any potentially suitable, but presently unoccupied habitat for the forementioned wildlife species.



WIBAUX - BEACH WILDLIFE STUDY AREA AND KNOWN RECOVERABLE COAL RESOURCE AREA

FIGURE 1

The following BLM Manual Definitions are relevant to this inventory:

1. Habitat. Includes food, water, cover, and space necessary for existing wildlife species.

2. Seasonal Use Areas. Includes areas which are normally used and can be separated by seasons of the year, such as winter, summer, year-long, etc.

3. Crucial Areas. Includes parts of the habitat which are necessary to sustain the existence and/or perpetuation of a wildlife species at critical periods during its life cycle or those factors needed to maintain a healthy wildlife population in their normal life cycle, e.g., antelope kidding grounds, fish spawning areas, prairie chicken booming grounds, sage grouse strutting grounds, sharptail grouse dancing areas, etc.

4. Special Areas. Includes areas which have been withdrawn, designated or otherwise specially identified for the protection of a wildlife species.

5. Migration Routes. Includes areas traversed by wildlife populations in their periodic movement from one seasonal use area to another, commonly used from year to year.

6. Habitat Problems. Includes habitat components which are creating a limiting influence on the wildlife population.

7. Habitat Conflicts. Includes uses of the habitat which create an adverse impact upon the wildlife species.

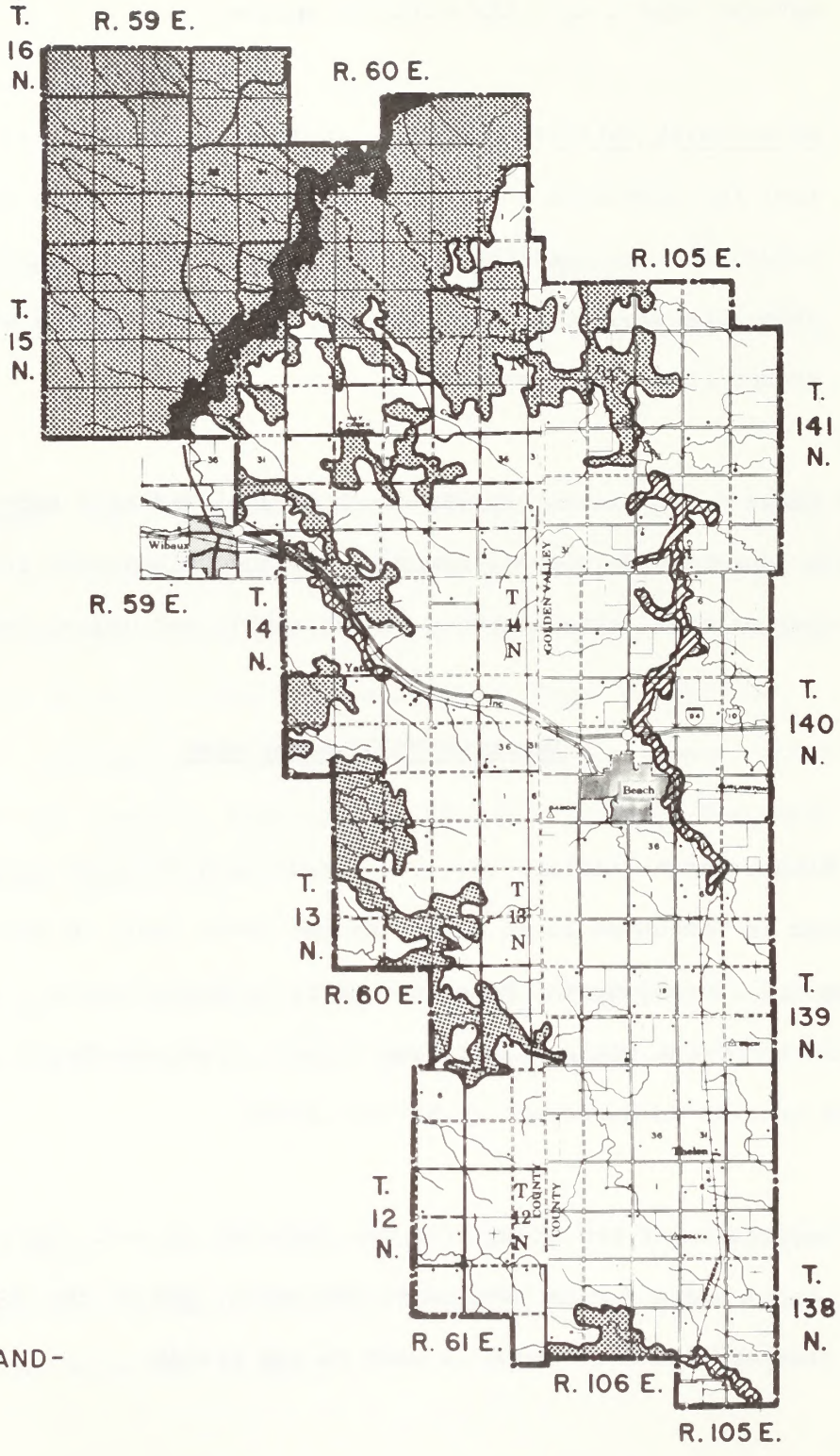
8. Potentially Suitable Habitat. Includes areas which may have potential for providing additional suitable habitat for a species if the unsatisfactory conditions are corrected. These areas may also be favorable habitat for an individual wildlife species which does not occupy it at the present time.

This phase of the inventory was first established as a two-year program. As the inventory developed, however, the objectives were fulfilled with one year of field time starting August, 1977, and ending August, 1978.

Description Of Study Area

The Wibaux-Beach wildlife inventory study area is a 258 square mile area located in Townships 12-16 North, Ranges 59-61 East, of Montana, and Townships 138-142 North, Range 105 West, in North Dakota. This area is within the Great Plains-Shortgrass Prairie Province-Wheatgrass-Needlegrass Section as described by Bailey (1978).

The vegetation of the study area was included in four categories (Figure 2). Small grain fields covered 95,880 acres, 58% of the total. Windrows and shelterbelts were found in many of the fields.



VEGETATION CLASSIFICATION

FIGURE 2

The rolling grassland-shrub complex comprised 62,320 acres or 38% of the study area. The most common grasses found there are blue grama (Bouteloua gracilis), green needlegrass (Stipa viridula), western wheatgrass (Agropyron smithii), and little bluestem (Andropogon scoparius). Fringed sagewort (Artemesia frigada) and sweet clover (melilotus sp.) are common forbs. Woody draws are found intermittently throughout the grasslands. Green ash (Fraxinus pennsylvanica), box elder (Acer negundo), chokecherry (Prunus virginiana), rose (Rosa sp.), snowberry (Symphoricarpos occidentalis), and buffaloberry (Sheperdia argentia) are common woody species found.

Beaver Creek, a perennial stream, enters the study area one mile north of Wibaux, Montana, continues north, northeasterly through the area, and eventually empties into the Little Missouri River in North Dakota. The creek bottom habitat along Beaver Creek is 3,740 acres, 2% of the study area. Broadleaf trees line the bottomland where agricultural development has not altered the native vegetation. Green ash and box elder are most common and plains cottonwood (Populus sargentii) is intermittently found. Buffaloberry, chokecherry, rose, snowberry and wild plum (Prunus americana) generally make up the understory. A large share of the bottomland had been tilled and was utilized for hay production.

The grass-coulee vegetation type is 3,170 acres or 2% of the study area. The majority of this habitat was found along Little Beaver Creek before it reached Odland Dam, north of Beach, North Dakota. Smooth brome (Bromus inermis) and Poa sp. were the most commonly found grasses.

Climate

The Wibaux-Beach area climate can be described as continental with cold winters, warm summers and marked variation in seasonal precipitation. The average annual rainfall is 14.45 inches per year at Wibaux with 80% occurring during the growing season, April-September. Winter snowfall averages 29 inches per year.

January is the coldest month with an average minimum temperature of 1.0°F, and a maximum of 23.8°F. July is the warmest month with 52.2°F and 83.7°F being the average minimum and maximum temperatures, respectively.

The average temperatures and rainfall differed considerably during the yearlong study period. From August, 1977, through July, 1978, Wibaux received 19.46 inches of precipitation. During January, the average minimum temperature was -9.1°F, while the maximum was 11.1°F. This was a 10.6°F departure from the normal.

Physiography And Soils

The Wibaux-Beach study area is generally a gently rolling plains with little change in altitude throughout. The central focus of the area is Beaver Creek, cutting through the north portion of the study unit forming a fairly narrow flat bottomland.

The soils of the area are generally silt-loam with differing stages of development and organic matter. The areas of native grasses are relatively thinly developed and low in organic matter. The tilled areas are more developed and contain greater amounts of organic matter. The Beaver Creek bottomland is silt-loam alluvium -- well developed and high in organic matter (Appendix 1).

METHODS

Wildlife Census Techniques

For the most complete inventory possible, the field observer made an attempt to travel every available road or trail of the 258 square mile study area in a systematic way. This enabled the biologist to observe every section of land accessible by road or trail in the unit. Several landowners were contacted concerning use of private roads. As more roads became available for use, they were added to the existing routes. The study area was divided into three geographical units and the roads were traveled by the observer (Appendix 2). Several stops (approximately every ½ mile) were made on each route with the observer glassing the total area with binoculars and spotting scope. These routes were generally traveled in the early morning and evening hours, as these time periods proved to be the most productive observation hours. The census routes were altered in the winter and spring (because of accessibility) due to drifting snow and/or muddy trails.

The observer constructed a grid system on ½" per mile BLM management maps of the area. When a wildlife observation was made, the data was recorded under the following criteria; day, species, sex, age class, vegetation, and location, from the field map to the nearest .1 mile. This data was then documented on wildlife observation sheets (Appendix 3).

The BLM contracted Miles City Aero Service to make wildlife census flights in the Wibaux-Beach area. A Super-Cub aircraft or Cessna 180 was used, flying the study area at 1-mile intervals in a north-south direction.

The flights were made during early light hours and the wildlife observer would record the data under the same criteria as used for the Route-Census data. These flights were made in the fall and winter months of 1977 and 1978. They were most effective when trees were bare and the ground was covered with snow.

A sharptailed grouse dancing grounds search was made in April and May of 1978. The grasslands areas were traversed by vehicle at ½ hour before sunrise until 8:00 a.m. The observer would stop the vehicle several times, scan the area with binoculars or a spotting scope and listen for the dancing grouse. Located grounds were documented on the ½"/mile map, with the date and number of males on the grounds. Many of the grounds were revisited in an attempt to establish the peak number of males displaying on the lek.

An index of crowing pheasant males can establish a trend of the pheasant population of a given area. The wildlife biologist established four pheasant crow count routes in the Wibaux-Beach study area (see Appendix 4). Each route was 20 miles long. The observer would stop the vehicle at 1-mile intervals, listen for crowing pheasants for a 2-minute period

and record the total number of crows heard at each stop. The counts were started at ½ hour before sunrise. They were run several times during May, 1978, when weather conditions permitted to census the peak crowing period.

Pheasant brood sizes were recorded in July and August, 1978, to establish a mean brood size. The biologist used a bird dog to locate the broods. When the dog made a point on the pheasants, the observer would walk into the area and flush the entire brood of birds. The date, location, vegetation type and size of brood were recorded. This method was most successful in the morning hours, when there was sufficient moisture to enable the pointer to find the birds most easily.

After the 1978 spring snowmelt, the Wibaux-Beach area was traveled to inventory the potential waterfowl habitat. Wetland areas were recorded as temporal streams, perennial streams, permanent reservoirs, surface water and ponds. These sites were checked for existing waterfowl. Later in the spring, they were again checked to determine if the site still existed, and was suitable for waterfowl nesting, and brood rearing. These areas were mapped showing location and permanence (Appendix 5). All waterfowl and broods were recorded by date of observation, species, location, and size of brood.

Other Methods

Various other methods were used to make wildlife observations in the Wibaux-Beach study area. Some were more successful than others. The pointer dog was used at various times throughout the year to locate adult as well as juvenile game birds. This proved to be a useful technique as the dog was able to cover large areas and locate birds more successfully than the observer.

A high beam spotlight was used several times in an attempt to make twilight wildlife observations. The roads were traveled by vehicle and several stops were made, shining the light across areas to observe nocturnal animals. This method met with limited success.

Correlation To Other Studies

The infra-red photography interpretation of the Wibaux-Beach area, provided by ECON Incorporated, outlines 7 land unit types. They are: small grain, nonirrigated hay lands, mesic shrub, broadleaf open canopy, upland grassland, xeric shrub, and grassland coulee. These classifications were based upon the "ecoclass" concept described by Corliss and Pfister (1973). This method utilizes a combination of vegetation and landform characteristics (called ELU's) to define the area.

This classification, however, did not best suit the purpose and objectives of this wildlife habitat study. For example, a small grain field

along Beaver Creek does not have similar function for wildlife as a small grain field in the upland areas south of Beach, North Dakota, where there is little nearby cover. Yet, under the ELU concept, these two areas would be classified similarly.

It was more functional, for this study, to classify areas as habitat types. Wildlife utilizes a variety of vegetative types for food, cover, nesting, loafing, breeding; so, combining utilized vegetative characteristics to form a habitat type was more appropriate. A creek bottom habitat takes into account the many different types of vegetation including agriculture, open canopy forest, mesic shrub, xeric shrub, and meadows that exist along a creek bottom. The importance of this diversity of species and their interspersion is well documented. From the standpoint of wildlife, the diversity of vegetation is as important as the composition of vegetation (Leopold, 1933).

Four major habitat types, then, were found in the study area (Figure 2). They are Creek Bottom, Grassland-Shrub Complex, Small Grain Agriculture, and Grassy Coulees. The relationship of these types to the ELU classification is shown in Table 1.

TABLE 1

Cross Reference For Habitat Type and ELU Comparison

Habitat Type	Small Grain	Wind-rows	Hay-field	Mesic Shrub	Xeric Shrub	Broad-leaf Trees	Upland Grass	Grass Coulee
Creek Bottom	X		X	X	X	X		X
Small Grain	X	X						X
Grass Coulee								X
Upland Grass-Brush	X			X		X	X	X

The further compliment this classification scheme, an interspersion index was developed using the method described by Baxter and Wolfe (1971). This technique involved overlaying a square, equal to one section of land, on the infra-red photography and counting the total number of vegetative changes (not types) along each diagonal of the square. This was done for each section of land in the study area so a comparative diversity index, by section, could be made. This would further demonstrate the significance of the variety and interspersion of vegetation to wildlife in the Wibaux-Beach study area. The average interspersion coefficient by habitat type is shown in Table 2 below.

TABLE 2

Interspersion Coefficient By Habitat Type

Habitat Type	Interspersion Coefficient
Creek Bottom	58
Grassland-Shrub	19
Small Grain	7
Grass Coulee	17

WHITETAIL DEER

Population

Whitetail deer populations have been documented in Montana since the earliest records. Lewis and Clark found them to be abundant along the Missouri River from the North Dakota border to Fort Benton. They were found along other portions of the Missouri, Jefferson, Beaverhead, Gallatin and Yellowstone Rivers, also, but were not as numerous in these areas (Lewis and Clark, 1804).

In the early 1940's, whitetails were most abundant in the mountainous regions west of the divide. East of the divide, whitetails disappeared from much of their historic range and were found mainly along portions of the Missouri, Yellowstone, Milk and Musselshell Rivers (Allen, 1971).

Since 1941, whitetail range expanded to the point where every county in the state has at least a small population. West of the divide, the population dwindled. East of the divide, they extended their range along bottomlands of most major rivers and streams (Allen, 1971).

Little background data for whitetail deer in the Wibaux-Beach study area was available. More recently, the Montana Fish and Game Dept. has kept harvest data statistics for their designated hunting districts. Most of the study area in Montana falls within District 750 and North Dakota within the Badlands Unit. The harvest data from 1972-1976 is shown in Table 3.

TABLE 3

Whitetail Deer Harvest Statistics in District 750, Montana and the Badlands Unit, North Dakota

(From MT Fish and Game and ND Game and Fish)

	District 750 (MT)	Badlands (ND)
1972	595	2335
1973	981	1483
1974	793	2160
1975	569	1053
1976	-	911

These figures indicate a stable population of whitetails in the area. Furthermore, Area 750 has sustained one of the highest harvests of whitetails in Region 7. It should be noted that District 750 also includes that portion of the Yellowstone River from Glendive to Sidney, not included within the boundary of the Wibaux-Beach Study Area.

Current Population

The Wibaux-Beach area supports a substantial population of whitetail deer. Most of these were concentrated along the Beaver Creek bottomlands. A total of 1,714 whitetail observations were made from August, 1977, through August, 1978. On a single observation day, without duplication, 211 deer were seen along Beaver Creek.

Aerial observations of deer were made from October to February. Nine total flights of the study area were made. The observation flights were most effective when the trees were bare and the ground was snow covered. The most productive flight yielded 115 observations of whitetail deer.

An aerial census of the study area in Montana was performed by Montana Fish and Game, north of Interstate 94, in 1978. Their census cited a total count of 90 whitetail deer.

Habitat

Whitetail deer are generally associated with riparian bottomlands in eastern Montana. This is often tied in with agriculture that exists along most river and stream bottoms in the state. Deciduous browse plants including: chokecherry, rose, snowberry, and buffaloberry, are preferred whitetail foods. Green Ash, Box Elder and Cottonwood trees provide escape and fawning cover for the whitetails.

Stomach samples of whitetail deer of the Missouri River bottomlands, collected in 1964-65, showed that browse was the most important forage utilized during all seasons except summer when forbs were mostly used. Grass represented a minimum part of the diet except in spring. Alfalfa and small grain became important foods when they were available (Allen, 1968). Hamlin (1977), in a study of whitetail deer prairie-agriculture habitats of eastern Montana, found snowberry, rose and barley to be important foods during fall and early winter.

Habitat Use

Whitetail deer were observed using a variety of vegetative types in the Wibaux-Beach study area. Sightings coincided closely to the five vegetative types as illustrated in Table 4. More importantly was the high concentration of observations in the creek bottom habitat type shown in Table 5.

TABLE 4

Percentage of Whitetailed Deer Observations
by ELU Type (Sample Size 1714)

Small Grain	Hay Fields	Mesic Shrub	Xeric Shrub	Broadleaf Trees	Upland Grassland	Grassy Coulee
23.5	18.3	22.0	0.8	12.4	20.2	2.6

TABLE 5

Percentage of Whitetailed Deer Observations
by Habitat Type

Creek Bottom	Grassland-Shrub	Small Grain	Grass Coulee
82.4	7.9	9.8	

The Beaver Creek bottom land provides all the requirements for a healthy, productive whitetail deer population. Food (browse and agricultural products), water and cover were all readily available. The diversity and interspersion of the vegetation was largely responsible for the high deer density. A correlation coefficient of .74 was calculated comparing

whitetail deer observations with interspersion of vegetation in each section. The average interspersion index derived for these sections within which Beaver Creek lies, was 58.

The grassland-shrub habitat, east and west of Beaver Creek, was also used commonly by whitetails. The deep, woody ravines, especially, provided excellent escape cover for deer. The interspersion of vegetation in the grasslands was much less than that found along the creek bottom, however. Thus, deer observations in the grassland-shrub were not as frequent as the creek bottom.

The wide expanses of small grain fields in the eastern and southern portions of the study area were capable of supporting only a small segment of the whitetail deer population. This habitat type lacked adequate browse and escape cover to fulfill the requirements of even a moderately dense population of whitetails.

Seasonal Use Areas

The Beaver Creek bottomland provided year-round habitat for whitetail deer in the Wibaux-Beach Wildlife study area. Deer observations were greatest in the creek bottom habitat for all seasons (Table 6). The grassland-shrub habitat, used commonly by whitetails in spring, summer and fall, was nearly devoid of deer or deer sign during the snow-covered winter and early spring months. Only grasslands adjacent to the creek

bottom habitat showed any sign of whitetail utilization during the winter. When an X^2 test of seasonal variation of habitat utilization was performed, a significant variation of use was found (Appendix 6).

TABLE 6

Seasonal Use of Habitat Types
by Whitetailed Deer

	Fall	Winter	Spring	Summer
Grassland-Shrub	36.5	14.9	6.3	21.7
Creek Bottom	58.8	78.5	93.7	72.5
Small Grain	4.8	6.6		5.8

Migration and Movement

The lack of visible winter activity of whitetail deer in the grasslands surrounding Beaver Creek led the observer to believe that the deer using this habitat during spring, summer and fall moved to the creek bottom habitat during winter. Large herds of whitetails, sometimes in excess of 70 deer, were observed yarding in the creek bottom habitat. This further supported this postulation.

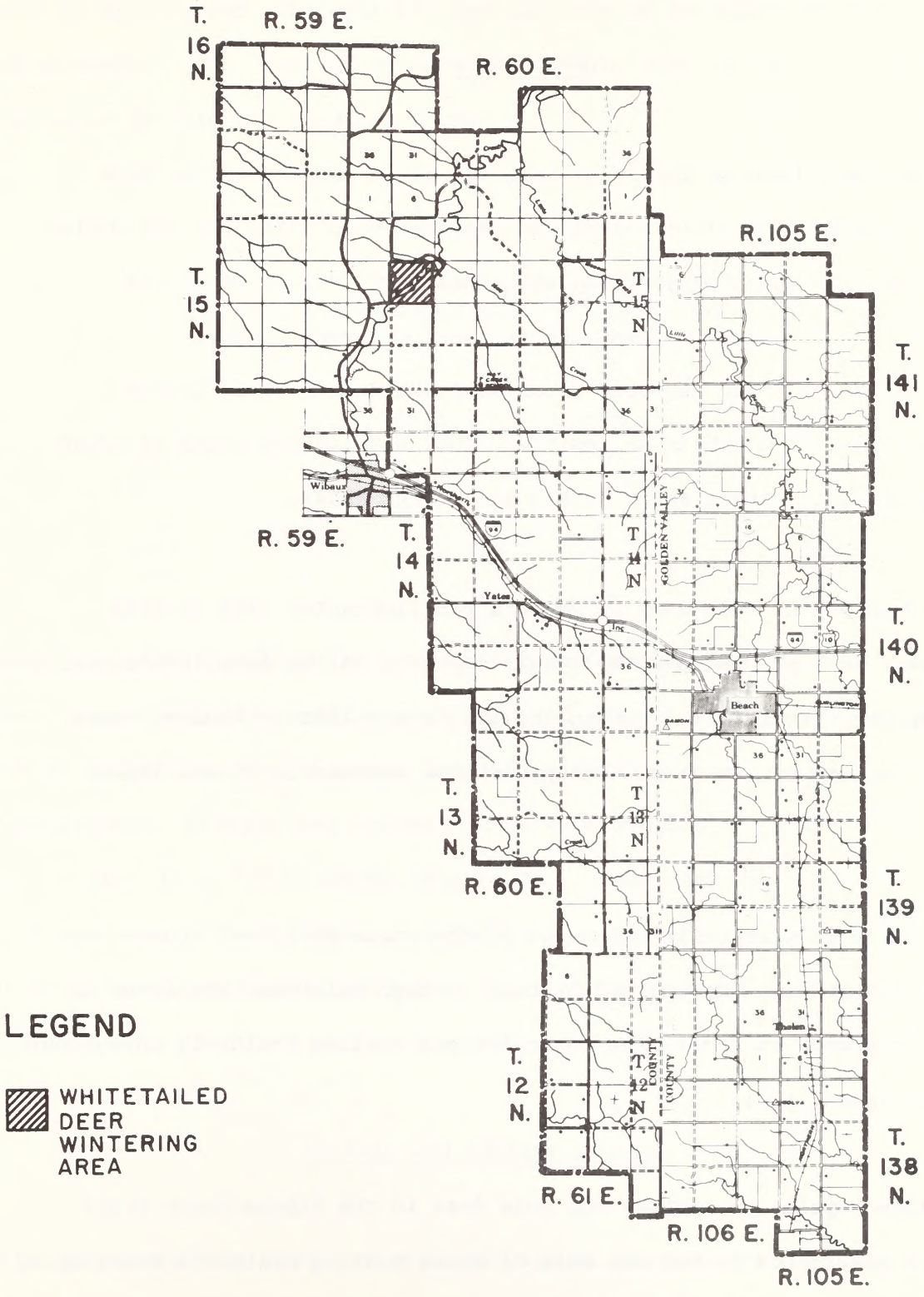
Crucial Areas

The entire Beaver Creek bottomland plays an extremely important role for the population of whitetails on the study area. The diversity of vegetation and the edge effect created by the brush and trees interspersed

with small hay and grain fields provide excellent year-round habitat for the deer. Any disruptive land use practice in this area would have detrimental effects on the population of whitetails.

There is one area of particular environmental concern for whitetail deer: Section 18 of T. 15 N., R. 60 E. The interspersion index derived for this section was 80, higher than for any other section in the study area. A total of 482 winter observations of whitetails were made in this section, or 42% of the total deer observations. At one sighting, more than 70 deer were observed in the section during winter. A total of 633 year-round observations were made in Section 18, 36% of all observations (Figure 3).

This particular area supported the greatest portion of the Wibaux-Beach area whitetail population. Loss of this important portion of the white-tail deers' habitat would seriously reduce their population in the wildlife study area.



CRITICAL WHITETAIL DEER HABITAT

FIGURE 3

MULE DEER

Population

Mule deer have been an important game animal in Montana as far back as records exist. The Indians used the deer for food, clothing and tools. Early fur trappers also depended upon them.

Lewis and Clark found "muleys" to be more abundant in the eastern prairies than in mountainous regions. They were seldom found in rough wooded or river bottom areas (Lewis and Clark, 1804).

The population of mule deer in Montana has fluctuated over several decades. Peak populations reportedly occurred in the late 1880's, early 1900's, and late 1920's. During the 1930's and 1940's, "muleys" were scarce in most of the state, except in some western locations (Egan, 1971).

Mule deer were present in all parts of the state by 1950. Since then, their distribution has changed little. Today, mule deer are found in river bottoms, badlands, high mountains and rolling foothills throughout Montana (Egan, 1971).

Available population history for mule deer in the Wibaux-Beach study area is restricted to harvest data of State Hunting Districts overlapping

the unit. District 750, comprised all of the 148 sq. miles of the study area in Montana and the remaining portion lies in the Badlands Unit in North Dakota. The comparative harvests of mule deer in District 750 and the Badlands Unit are shown in Table 7.

TABLE 7

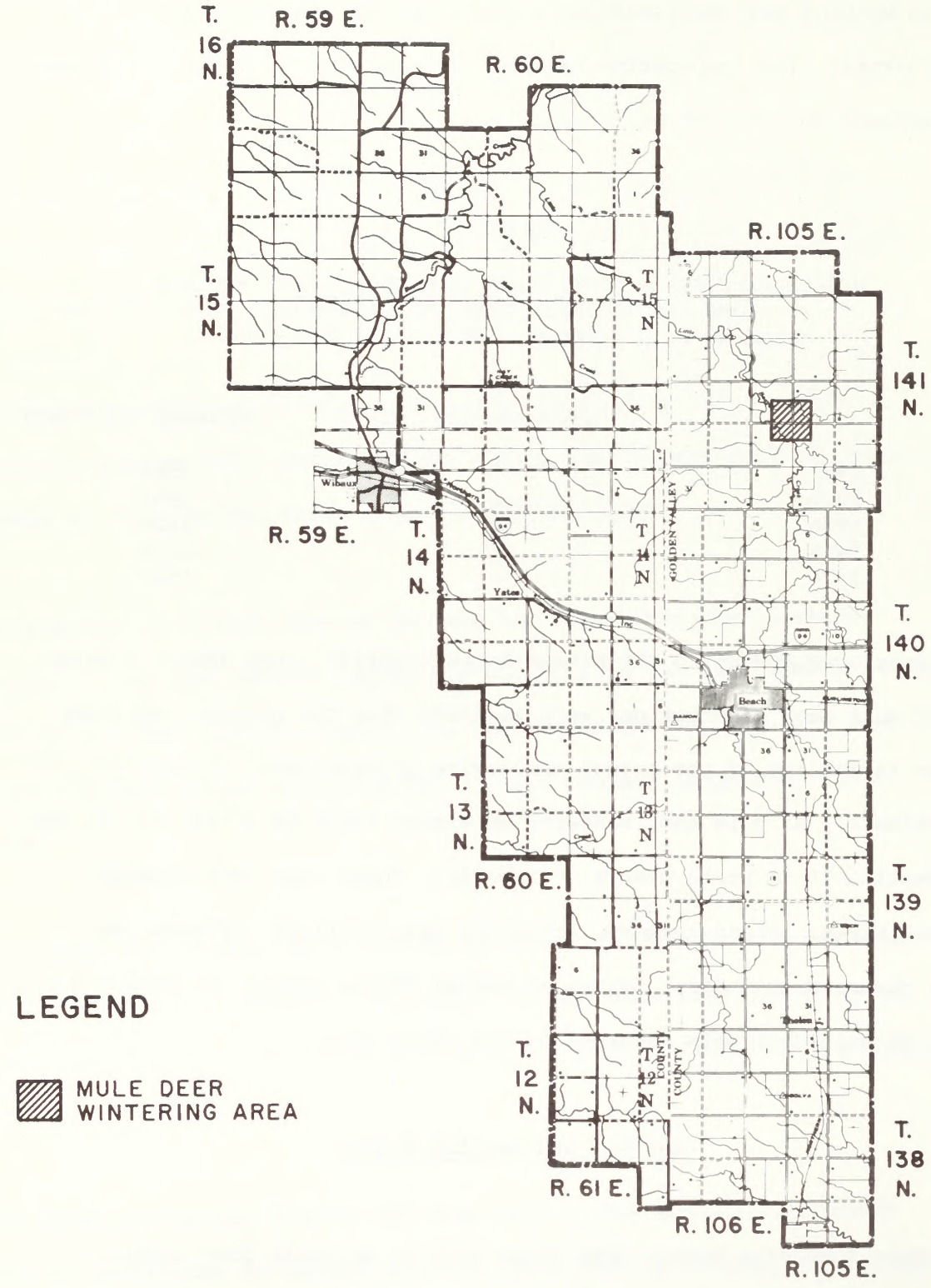
Mule Deer Harvest Statistics in District 750, Montana and the Badlands Unit, North Dakota (From MT Fish and Game and ND Game and Fish)

	District 750 (MT)	Badlands Unit (ND)
1972	0	3544
1973	0	1467
1974	0	1826
1975	24	2859
1976	-	2588

Mule deer were common in the Wibaux-Beach wildlife study area. A total of 535 mule deer observations were recorded over the period. This may not be indicative of the actual population of mule deer. A herd of approximately 45 mule deer wintered on a corn field at T. 141 N., R. 105 W., Section 21 in North Dakota (Figure 4). These deer were sighted several times. Their numbers, recorded several times inflated the total observation number. During an aerial census flight on January 11, 1978, 66 mule deer were recorded on the study area.

Habitat and Habitat Status

Mule deer generally prefer open areas with an adequate food supply, interspersed with nearby escape cover of trees, brushy draws or breaks.



MULE DEER WINTERING AREA

FIGURE 4

Does will usually select an area of dense brush or trees for fawning.

"Muleys" are selective feeders, their diet depends upon the time of the year, weather, plant growth and condition. Hoffman (1973) found them to be neither strictly browsers nor grazers, but rather, opportunistic feeders. In a food habits study by Montana Fish and Game (1977), mule deer in Rosebud County, Montana, utilized browse, forbs and grasses and at significantly different proportions throughout the year.

The limiting factor for Montana mule deer populations is the quantity and quality of winter browse. Mountain mahogany (Cercocarpus ledifolius), bitterbrush (Purshia tridentata), chokecherry (Prunus virginiana), juniper (Juniperous spp.), mountain maple (Acer glabrum), serviceberry (Amelanchier anifolia), Ceanothus sp., big sage (Artemisia tridentata), silver sage (A. cana), fringed sage (A. frigida), skunkbush (Rhus trilobata), rabbitbrush (Chrysothamus sp.), and dogwood (Cornus stolinifera) are some of the more important browse species in the diet of Montana mule deer. The availability of this winter food supply is the variable that most determines the carrying capacity for mule deer. (Mussehl and Howell, ed., 1971).

Mule deer utilization of different ELU and habitat types in the Wibaux-Beach Study Area is shown in Tables 8 and 9.

TABLE 8

Percent of Mule Deer Observations
by ELU (Sample Size = 535)

Small Grain	Hay Fields	Mesic Shrub	Xeric Shrub	Broadleaf Trees	Upland Grassland	Grassy Coulee
21.9	28.2	14.8		2.4	29.3	3.4

TABLE 9

Percent of Mule Deer Observations
By Habitat Type

Creek Bottom	Grassland-Shrub	Small Grain	Grassy Coulee
5.2	15.3	76.8	2.8

Seasonal Use Areas

The number of observations in each habitat type is shown by season in Table 10. The significantly large number of sightings during the winter were in the small grain field habitat. A winter herd of greater than 40 "muleys" wintered near a cornfield in North Dakota (Figure 4). According to the local owner of the property, Clair Ross, the deer have wintered in that area for several years. When an X^2 test of seasonal variation of habitat use was performed, significant variation was indicated by the results (Appendix 7).

TABLE 10

Seasonal Use of Habitat Types
by Mule Deer

	Fall	Winter	Spring	Summer
Grassland-Shrub	4.2	16.0		39.1
Creek Bottom	5.6			17.4
Small Grain	77.5	84.0	100	43.5
Grass Coulee	12.7			

Crucial Areas

Although the forementioned area is an important wintering ground for mule deer, it is not considered a crucial area for mule deer. It is likely that land use practices in this area will change as the farm market changes. If a less desirable forage were planted, the deer would probably winter elsewhere.

Habitat Problems and Conflicts

The rolling expanses of wheatfields that have displaced the native grasslands in the Wibaux-Beach area eliminated forage and cover necessary to sustain a healthy mule deer population; nearly 60% of this native range was altered. Generally, the areas that were plowed were historically the most productive soils (i.e., more developed, more organic - Soil Survey Wibaux Co.).

As hay and wheatfields were introduced to the Beaver Creek bottomland, the habitat became more suitable for whitetails. Several local residents made reference to the displacement of mule deer by whitetails the last 30 years.

ANTELOPE

Population

The antelope has been associated with the rolling sagebrush-grasslands of eastern Montana and western North Dakota since the earliest records. The species was widespread and abundant in Montana before settlement. An early estimate of 2,500,000 antelope was reported for Montana before 1896. As the state was settled, the population fluctuated. Overgrazing and cultivation of native prairie were the primary reasons for of the pronghorns decline. The population dwindled to around 3,000 animals by 1924. After the early 1930's, the antelope population increased to about 75,000 by 1965. (Compton, Egan, Trueblood, 1971).

Since 1961, the Montana Fish and Game Department has carried on a total count aerial census of antelope. About one-third of each administrative district is flown annually. That portion of the Wibaux-Beach wildlife study area in Montana is partially in districts 750 (north of Wibaux) and 761 (south of Wibaux). The latest census of these units was 287 antelope in district 750 (1973) and 1911 in district 761 (1975).

During the Wibaux-Beach wildlife inventory, 747 antelope observations were obtained. The greatest number of pronghorns observed in one day from census routes was 43; while, the greatest number of antelope observed from aerial census flights was 31.

The year-round population of pronghorns in the study area was very low. A small herd of five antelope were the only ones known to winter within the study unit boundaries.

Habitat and Habitat Status

The antelope are typically found in open rolling plains. Sagebrush-grassland areas, where the vegetation provides a food source, yet is not so tall to prevent good visibility, are preferred. Cover is not a factor for adult pronghorns except during periods of severe storms when they may seek shelter from the weather (Hoover, 1959). Antelope are commonly seen in small grain or alfalfa fields since visibility rather than escape cover is required (Cole, 1956 & 1958). Although areas with tall, dense sagebrush are usually avoided, preferred kidding grounds of the Great Basin were found in low shrubs, 9-18 inches high (Einarson, 1948).

The preferred food of prong-horned antelope is browse, with sagebrush (Artemisa sp.) being the most important plant species in the northern region while many southern antelope depend primarily upon forbs. Grass comprises about 1% of their diet (Buechner, 1950).

In a central Montana study, observations of antelope feeding indicated the winter forage consisted of 93% shrubs and 6% forbs. Big sage (Artemisia tridentata) was in 79% of the total observations. In the same area, two summers of observations indicated heavy forb use (Bayless, 1968) (Table 11).

TABLE 11

Summer use of Vegetation by Prong-horned Antelope
in Central Montana (Bayless, 1968)

	1966	1967
Forbs	86%	97%
Shrubs	14%	3%
Grass	T	T

In the Wibaux-Beach study area, prong-horned antelope observations were most frequent in the grassland-shrub and small grain habitat types.

TABLE 12

Habitat Use by Antelope
in the Wibaux-Beach Area

Creek Bottom	Grassland Shrub	Small Grain	Grass Coulee
	56.3%	38.3%	5.4%

Cole (1958) found that antelope observed in small grainfields in central Montana were within one mile of rangeland, and 89% of these antelope were within one-half mile of rangeland.

Only two small areas of sagebrush, located in T. 15 N., R. 60 E., Section 18 and T. 16 N., R. 60 E., Sections 33 and 34, were found on the Wibaux-Beach study area. Both of these sagebrush areas are located along Beaver Creek with brushy-riparian areas nearby. The restriction of visibility in these locations likely precluded antelope utilization as no observations were made there.

Antelope habitat in the Wibaux-Beach study area is marginal at best. Only 5 pronghorns wintered on the area. The lack of Artemisia sp. for food, kidding cover, and winter cover, probably restrict this antelope population severely.

Seasonal Use

Antelope were observed most often in the grassland-shrub or small grain habitat for all seasons (Table 13). When a X^2 test for seasonal habitat use was performed, considerable variation in seasonal use was found (See Appendix 8).

TABLE 13

Seasonal Use of Habitat Types by Antelope

Habitat Type	Fall	Winter	Spring	Summer
Grassland Shrub	44.3	20.0	83.3	68.6
Creek Bottom				1.0
Small Grain	55.7	45.0	16.7	27.5
Grass Coulee		35.0		2.9

RING-NECKED PHEASANT

Population

Montana, prior to agricultural development, was not suitable habitat for the ring-necked pheasant. The unbroken expanse of rangeland did not insure the concentrated food supply needed by pheasants. It was not until irrigation was introduced (1842, Bitteroot Valley) that Montana was able to support the popular game bird (Janson, Hartkorn, Green, 1971).

Agricultural development was slow in Montana until 1870. By 1900, 13% of Montana's surface was farmed. The cultivated bottomlands became less favorable to the native sharptail grouse and an upland game bird void became apparent. The ring-necked pheasant became a likely candidate to fill that vacant niche (Janson, Hartkorn, Green, 1971).

The first apparent purchase and release of the ring-necks in Montana was by private concerns prior to 1895. The exact location of the transplant is unknown. However, according to the first Montana Fish and Game Commission's biennial report, "These birds have been imported and released year after year, but their propogation has been anything but successful."

The practice continued, however, and the Montana Fish and Game Department also purchased pheasants and distributed them widely. Between 1909-

1920, approximately 7,000 birds were released, chiefly in Lincoln, Flathead, Lake, Ravalli and Teton counties. In 1920, pheasants were released near Lewistown and Glasgow and were reported to have done well. By 1928, Montana had it's first hunting season for pheasants in some parts of the state. Wibaux County opened its first season on pheasants in 1931 (Janson, Hartkorn, Green, 1971).

The pheasant population reached high densities in Montana between the late 1930's and early 1940's. Climatic conditions and farm practices provided an optimum situation for a boom in the pheasant population. Then, as food demands rose, abandoned farm land was put back into production. The pheasant's habitat rapidly diminished and the population crashed during the 1944-1946 period. Since this time, several fluctuations in the population of ring-necks have occurred (Weigand and Janson, 1976).

The earliest record of pheasant releases in Wibaux County was 1930 when 96 birds were shipped railroad express to O. W. Johnstone. In August, 48 birds were released "along all creeks between Wibaux and the Dawson County line". In September of that year, 24 birds were released 6 miles south of Wibaux along Beaver Creek and 24 birds north of Wibaux along Beaver Creek.

Subsequent pheasant releases are shown in Table 14. An intensive stocking program apparently continued until 1959, when the transplanting program was discontinued.

TABLE 14
Pheasants Released in Wibaux County, Montana
(Bob Green, Montana Game Farm, 1978)

Date	Number of Pheasants	Area of Release
1931	24	19 miles north of Wibaux along creek
1931	24	First large coulee opposite Glendive on Wibaux road
1931	24	Second large coulee opposite Glendive on Wibaux road
1931	24	South Fork of Seven Spring Creek
1931	12	North Fork of Seven Spring Creek
1931	12	Tennant farm
1931	12	Elfta farm (upper Beaver Creek)
1931	12	Bron farm (Box Elder Creek)
1932	24	18 miles south of Wibaux
1932	24	Balke farm (Beaver Creek)
1932	24	Section 20, 6 miles southwest of Wibaux
1933	200	8 ranches 6-20 miles from Wibaux
1934	50	Section 2, T. 10 N., R. 59 E.
1934	50	Section 19, T. 14 N., R. 59 E.
1934	50	Section 20, T. 13 N., R. 59 E.
1934	50	Along Beaver Creek
1935	200	Along Beaver Creek
1936	200	10 miles south of Wibaux on Beaver Creek
1937	200	18 miles north of Wibaux to 14 miles south of Wibaux
1938	125	12 miles south of Wibaux on Beaver Creek
1938	75	10 miles north of Wibaux on Beaver Creek

Table 14 (Continued)

1939	300	1946	500	1953	1094
1940	400	1947	1000	1954	750
1941	600	1948	400	1955	961
1942	500	1949	600	1956	200
1943	350	1950	600	1957	200
1944	250	1951	683	1958	450
1945	0	1952	465	1959-1977	0

The pheasants were abundant along Beaver Creek, according to local ranchers and farmers, until 1964. The severe winter of 1964-65 all but eliminated the pheasant population in southeastern Montana. The pheasant harvest in 1964 was 32,221 birds in the southeastern portion of the State. In 1965, the harvest decreased to 1,560, demonstrating the dramatic losses that occurred. The harvest has since increased in subsequent years and has been fairly stable, around 7,500 birds. (Montana Fish & Game Dept., 1976).

Ring-necked pheasants were very abundant in the Wibaux-Beach study area. A total of 1,656 pheasant observations were made during the study period -- their greatest numbers found along the Beaver Creek drainage and its tributaries.

Four pheasant crow-count routes were established. The routes were run from March 29 until April 26. The peak crowing date was April 20. The average number of crows per stop in each habitat type is shown in Table 16. Results of other crow-count routes in eastern Montana, run annually by the Montana Fish and Game Dept., are also shown for comparison.

Pheasant broods were observed in June and July, 1978. Thirty-eight broods were observed in the study area. The average number of chicks per brood was 7.5.

TABLE 15

Pheasant Calls/2-Minute Stop for Wibaux-Beach Area
and
Montana Fish and Game Region 7 Routes

	1978	1977
Wibaux-Beach Area		
Small Grain Habitat	0.2	
Grass-Shrub	6.3	
Creek Bottom	19.9	
Tongue River		17.8
Pumpkin Creek		11.8
Rosebud Creek		15.6
Otter Creek		24.4
Sarpy Creek		25.5
Isaac Homestead		16.0
Myers		20.8
Powder River		8.3
Cartersville		8.8

Habitat

The ring-necked pheasant is closely associated with agriculture, as farm crops (wheat, barley, corn and oats) make up as much as 77% of the bird's diet. The availability of this preferred food, coupled with the

close proximity of cover for escape and nesting are the essential requirements for pheasants.

Winter is a critical time for pheasants, as food and cover become difficult for the birds to find during long periods of deep snow. Heavy losses occur during severe blizzards when sufficient cover is not readily available.

Pheasants in the Wibaux-Beach study area were observed utilizing a variety of vegetative types. Table 16 shows the percent of observations in each type. More significantly, 66.3% of all pheasant observations were made in the creek bottom habitat type as shown in Table 17 below.

Table 16

Percent Pheasant Observations by Vegetative Type (Sample Size 1650)

Small Grain	Hay Lands	Mesic Shrub	Xeric Shrub	Broadleaf Trees (Open Canopy)	Upland Grassland	Grass Coulee
16%	23.6%	37.8%	0.6%	10.5%	7.4%	4.6%

TABLE 17

Percent Pheasant Observations by Habitat Type (Sample Size 1650)

Creek Bottom	Grassland-Shrub	Small Grain	Grassy Coulee
66.3%	23.7%	7.6%	2.3%

The entire Beaver Creek bottom, north from Wibaux through the entire study area could be classified as excellent pheasant habitat. Food,

cover, water and, most important, edge are in excellent supply there. The total number of pheasant sightings was in very strong correlation with the interspersion index of the corresponding section. The scatter diagram of these two indices is shown on Figure 5. The coefficient of determination (r^2) and coefficient of correlation (r) were derived from the formula:

Where:

A = Y intercept
b = slope
E = sum

$\overline{Y}$ = mean interspersion index
Y = interspersion index
X = total pheasant sightings
N = number of sections where observation occurred

$$r^2 = \frac{A(EYi) + b(EXiYi) - ny^2}{Ey^2 - ny^2}$$

Where r^2 = .861
and r = .927 for those sections with at least one pheasant recorded.

This factor further demonstrated the importance of the diversity and interspersion (edge) in the creek bottom habitat for the ring-necked pheasant.

The grassland-shrub complex habitat to the east and west of Beaver Creek supported pheasants also; but, their numbers were much lower than those along the creek bottom.

Several small populations of pheasants were found scattered throughout the rest of the study area where windrows and shelterbelts provided sufficient winter cover for the birds.

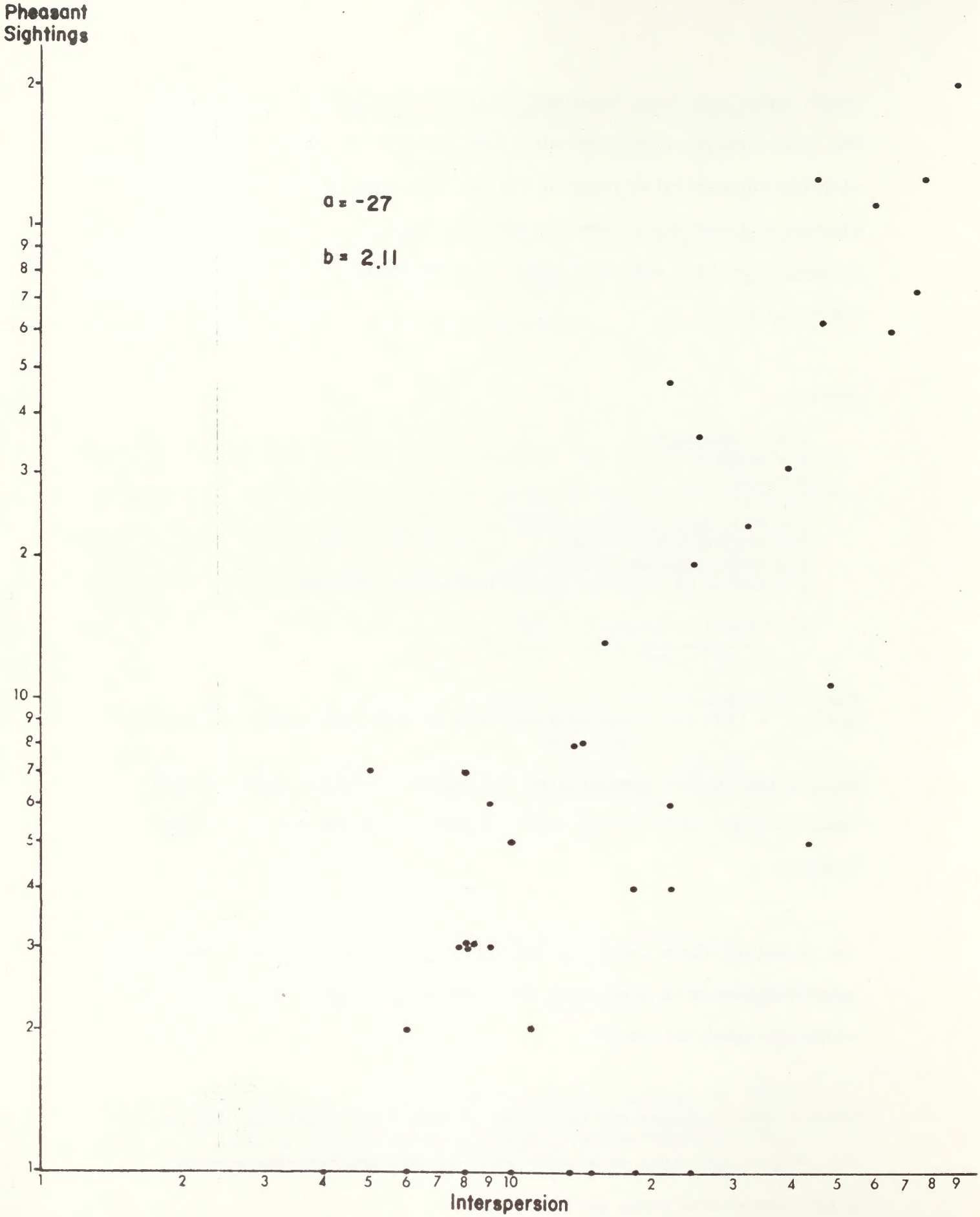


FIGURE 5. Pheasant Scatter Diagram

Habitat Problems

The major habitat problems for ring-necked pheasants in the Wibaux-Beach area is the loss of cover provided by brushy areas along Beaver Creek to cultivation. As cover is replaced by agricultural development, the balance between food and cover and the interspersion of the two factors is altered.

The haying practices, or more precisely, the timing of the haying is another problem for pheasants. Nesting peaks occur during the first half of May and incubation takes 23 days. Mowing was observed in June along Beaver Creek, thus those nests found in the alfalfa were probably destroyed or abandoned.

The Beaver Creek bottomland is primarily used for raising hay or grazing cattle. In those areas where cattle browse upon the woody plants or graze the ditchbanks and other uncultivated areas extensively, the cover value for pheasants is lowered or lost.

The mono-cultural agriculture practice in the small grain habitat has certainly led to a reduction in pheasants. The lack of cover and diversity of vegetation in this area has been detrimental to the pheasant.

Seasonal Use

Ring-necked pheasant utilization of different vegetative types, by season, is shown in Table 18. The creek bottom and grassland-shrub

habitat types were most important during all seasons. Flocking occurred during the winter months when as many as 70 pheasants were observed at some haystacks. When an X^2 test of seasonal variation of habitat use was performed, significant differentiation of use was found (Appendix 9).

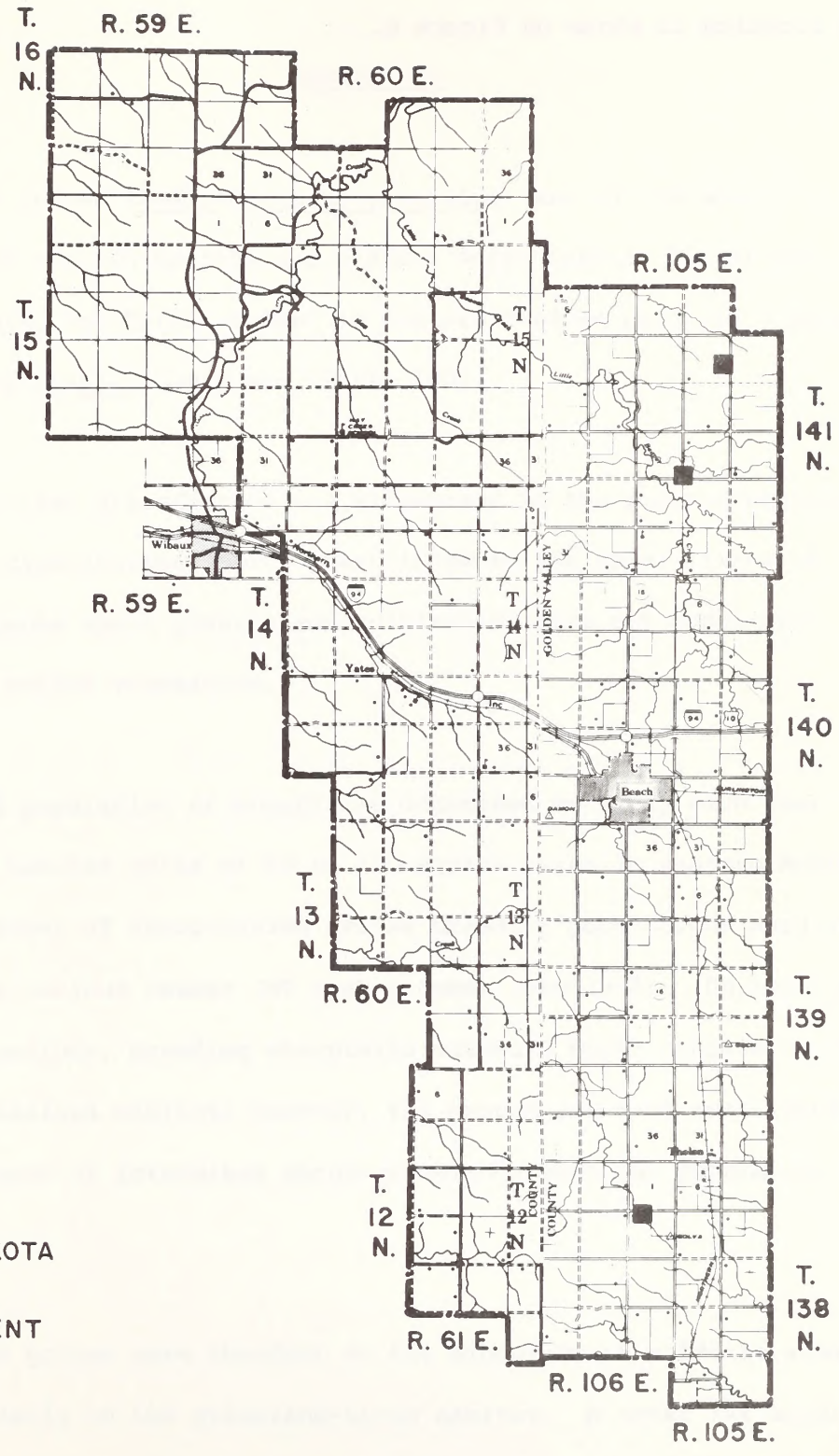
TABLE 18

Seasonal Use of Habitat Types
by Ring-Necked Pheasant

	Fall	Winter	Spring	Summer
Grassland-Shrub	47.0	14.8	16.2	37.4
Creek Bottom	40.7	78.6	83.8	59.1
Small Grain	9.3	6.6		3.4
Grass Coulee	3.0			

Special Areas

The ring-necked pheasant population suffered a severe setback due to winter kill in 1949-50. The North Dakota Game and Fish Department, with federal monies, undertook a tree planting program to provide winter cover for the pheasants. Through a cooperative agreement with landowners, the Game and Fish Department supplied the trees and the funding for the soil conservation districts to plant them on selected farmsteads. In the agreement, the landowner would not destroy or allow cattle to graze the habitat improvement units. This program has been discontinued, and the fate of those tree plots is totally at the discretion of the landowners.



LEGEND

■ NORTH DAKOTA PHEASANT HABITAT IMPROVEMENT UNITS

PHEASANT SPECIAL AREAS

FIGURE 6

Three of these tree plots were found on the Wibaux-Beach study area. Their location is shown on Figure 6.

SHARP-TAILED GROUSE

Population

Sharp-tailed grouse (Pedioecetes phasianellus) are native species of the grasslands of eastern Montana and western North Dakota. Lewis and Clark reported seeing the "prairie hen" in the prairies between the Missouri and the river platte (Lewis and Clark, 1804).

Although the past distribution was widespread in the prairie brushlands, the present distribution is more restricted to the upper limits of brushy drainages where grazing and cultivation have not completely altered the native vegetation.

The seasonal population of sharptails decreased markedly each year. On year-around habitat units of 40 to 100 square miles in eastern Montana, 65 to 75 percent of sharp-tailed grouse breeding populations were lost each year to various causes (MT Fish & Game, 1960-1968). During high population periods, breeding sharptails extended their range well into marginal grassland habitat; however, the grouse are more restricted to the best stands of intermixed shrub-grasslands when the population is low.

Sharp-tailed grouse were abundant on the Wibaux-Beach wildlife study area, especially in the grassland-shrub habitat. A total 742 total observations of grouse were made, excluding the spring lekking observations.

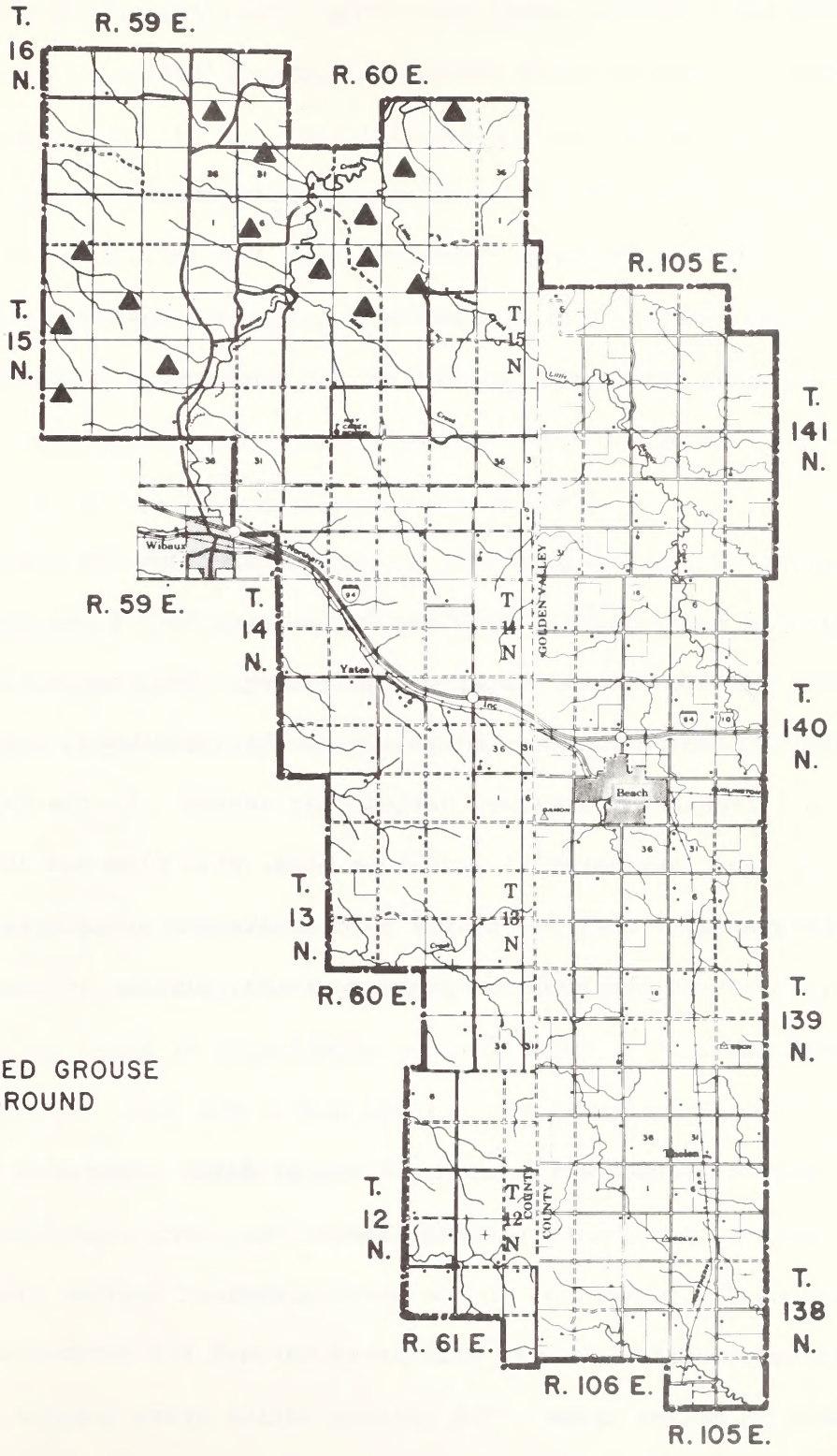
During April and May, 1978, 16 sharp-tailed grouse dancing grounds were located (Figure 7). The average number of lekking male grouse per arena was 18; the smallest ground had 5 males, while the largest ground had 42 males.

Assuming a 50:50 ratio of male to female sharptails (Robel, 1972), a minimum spring population of 576 grouse existed on the study area. This also assumes that the sixteen dancing grounds located were the only ones present. According to Rippon and Boag (1974), 50% of the total male population is non-territorial, and never appear on the dancing grounds. Again, assuming a 50:50 sex ratio, and 50% non-territorial males, the estimated spring population of sharp-tailed grouse was 1,152.

Sharp-tailed grouse hens with broods were located in July and August, 1978. Ten grouse broods were observed with an average of 7.8 chicks per brood.

Habitat

Sharp-tailed grouse require a variety of vegetative types for a strong population to fulfill their habitat requirements. Relatively flat, elevated terrain with short, sparse vegetation for dancing grounds, residual warm season grasses with accumulated plant litter for preferred nesting sites, a dense canopy of shrubs and forbs for brood rearing, and grassy slopes interspersed with woody vegetation for roosting were very



SHARPTAILED GROUSE DANCING GROUND LOCATIONS

FIGURE 7

important for sharptails in western Nebraska (Sisson, 1974). The characteristic of grasslands "broken-up" by brushy, deciduous cover is of paramount importance to the grouse (Brown, 1971).

Food intake of sharptails varies with the seasons. For 81% of the sharptails in the Colstrip, Montana, area, the fall diet was shrub fruits (mainly rose hips and skunkbush berries); however, animal matter (mainly grasshoppers) made up 79% of the food intake during the summer (Ecol. Consul. Div., 1976).

In western Nebraska sharptails, the spring diet was 99% plant material, mainly rose hips, sage and goldenrod; however, 56% of the diet was plant material and 42% animal matter in the summer. The composition of vegetative food changed markedly as gromwell, smartweed, and dandelion were most frequently utilized during that season. In the fall 83% of the diet was plant material with rose hips, wild plum and sumac utilized most frequently. Only 14% of the food intake was grasshoppers. In winter, 99.7% of the food was plant material, similar in composition to the fall diet.

Sharp-tailed grouse of the Wibaux-Beach wildlife study area were observed in a variety of vegetative types (Table 19). Most significant was 63.5% of the total observations in the shrub-grassland habitat (Table 20). The grouse distribution was widespread through the shrub-grasslands adjacent to Beaver Creek. The rolling native grass prairie with

scattered clumps of buffalo berry, rose and snowberry, interspersed with woody draws of chokecherry, wild plum, green ash, and box elder provide excellent habitat for the sharptailed grouse. Reservoirs and ponds scattered throughout the area and seasonal streams in the woody draws provide accessible water for the grouse.

Although the ring-necked pheasant is a better competitor for the creek bottomland habitat, the area also supported a substantial population of sharptails. Although the bottomland habitat did not support any breeding arenas, 24% of the observations were made there.

The shrub-grassland and creek bottomland habitats comprised 103 square miles of the Wibaux-Beach wildlife study area. An estimated population of 1,014 sharptails were found in these areas, or 10 grouse per square mile.

Small, isolated populations of grouse were found scattered throughout the small grain habitat in the rest of the study area. These grouse were most often found in wheatfields with windrows or shelterbelts nearby to provide cover and a food source. Sharptails are able to adapt to modern agriculture, where shade and water are available during the dry months of July and August (Brown, 1971).

TABLE 19

Percentage of Sharp-Tailed Grouse Observations
by ELU Type (Sample Size = 742)

Small Grain	Hay Fields	Mesic Shrub	Xeric Shrub	Broadleaf Trees	Upland Grassland	Grassy Coulee
16.3	2.8	38.7		5.8	28.0	8.4

TABLE 20

Percentage of Sharp-Tailed Grouse Observations
by Habitat Type

Creek Bottom	Grassland-Shrub	Small Grain	Grassy Coulee
24.3	63.5	12.3	

Seasonal Use

The sharp-tailed grouse of the Wibaux-Beach study area utilized a variety of habitat types in each season (Table 21. When an X^2 test on seasonal habitat use was performed, the variety of use was significant (Appendix 10.)

TABLE 21

Seasonal Use of Habitat Types
by Sharp-Tailed Grouse

	Fall	Winter	Spring	Summer
Grassland-Shrub	36.7	8.8		56.4
Creek Bottom	8.9	56.1	100.0	39.0
Small Grain	49.4	35.1		4.6
Grass Coulee	5.1			

Crucial Areas

Sixteen sharp-tailed grouse dancing grounds were located in the Wibaux-Beach wildlife study area in April and May, 1978. The arenas were found on short, sparse, grassy, elevated knolls in the rolling shrub-grassland habitat surrounding the creek bottomland habitat. No dancing grounds were observed in the small grain habitat throughout the eastern and southern sections of the study area. Other arenas may exist there, however, since small populations of grouse were observed in those areas.

Habitat Problems and Conflicts

Prior to the introduction of ring-necked pheasants in the Beaver Creek area, the sharp-tailed grouse probably inhabited the creek bottomland in greater numbers. Pheasants, more closely associated with agriculture, probably displaced the grouse along Beaver Creek where the vegetation changed from native species to hay and grain crops.

Historically, the small grain habitat area was rolling, mixed grass prairie interspersed with brushy patches. Modern agriculture practices and demands altered the area to pratically a monocultural acreage of rolling grain fields. Only those few areas with small sections of native grass or planted windrows and shelterbelts are capable of supporting any sharptails.

HUNGARIAN PARTRIDGE

Population

The Hungarian partridge (Perdix perdix) was first introduced in North America from central Europe in the late 1870's. The exotic game bird was most successful in the plains of southern Canada and the adjacent northern states (Trueblood and Weigard, 1971.)

The first introduction in Montana is unknown; however, a speciman was found in Sanders County, Montana, in 1915. The first transplants by Montana Fish and Game were in 1922 when 1,000 birds were released in 45 of the state's existing 54 counties (Trueblood and Weigard, 1971). An additional 2,000 Huns were released in 1923, and Jakways (1924) reported the Hungarians to be successful in Montana by 1924. The North Dakota Game and Fish Department released Hungarian partridge from Czechoslovakia in 1923 (Upgren, 1970).

Marlow (1926) indicated Hungarian partridge were released in every Montana county by 1926. The birds were raised at the Montana game farm and were released throughout the State until 1933 (Trueblood and Weigard, 1971).

The "Hun" population was successful in the agriculturally developed counties of Montana and the first Hungarian partridge season was au-

thorized by the State legislature in 1929. Partridge hunting has continued in Montana annually, except for seven years of closed season (1937-39, 1946-48, 1950).

The harvest record of Hungarian partridge in Montana, Region 7, is shown in Table 22.

TABLE 22

Hungarian Partridge Harvest Statistics For Region 7, Montana
(From MT Fish and Game)

YEAR	HUN HARVEST
1970	2032
1971	2126
1972	1763
1973	3981
1974	3250
1975	3417
1976	5801

Although Hungarian partridge were common in the Wibaux-Beach study area, only 562 total observations of Huns were made. The population seemed small when one considered the potential habitat for Huns with such a large area of small grain habitat available (95,880 acres).

Habitat and Habitat Status

The Hungarian partridge is closely associated with agriculture and rightly so, as small grains make up the majority of the Huns' diet. Grain crops made up 72.3% of the winter diet, 68.7% spring, 41.1% summer, and 48.2% of the fall diet of adult male partridge crops col-

lected in North Dakota from 1964 through 1976 (Hunt, 1977). See Appendix 11 for a breakdown of seasonal food use. Similarly, 89% of 91 adult and sub-adult and 88% of 40 juvenile partridge crops from Teton County, Montana included one or more grain species, wheat was the largest representative portion (Weigand, 1977).

A diversified habitat of grains, fallow, rangeland, hay, idle land and borrow pits are necessary for optimum Hungarian Partridge production.

Undisturbed grassy areas are most commonly selected by Huns for nesting. Lake and Kruse (1977) found in an eastern North Dakota study, 52% of the Hungarian partridge nests located along roadsides, field borders and unused vegetation. A combination of smooth brome and alfalfa was the dominant vegetation at 64% of the nests.

Ten Hungarian partridge nests were observed in Teton County, Montana, four in hayfields (three alfalfa and one grass), two in grass-dominant, agriculturally idle areas, two in grassy lowland ranges, one in a homegenous smooth brome borrow pit, and one in spring wheat stubble. Grass concealed five nests, while forbs concealed the remaining five (Weigand, 1977).

During severe winter conditions, Hungarian partridge seek protective woody cover. If protective cover can be found within one mile of a moncultural grain field, the area will support a small, but persistent population of Huns, although this is not considered optimum habitat (Weigand, 1977).

In the Wibaux-Beach study area, 62.8% of all Hungarian partridge sightings were in small grain habitat (Table 23). All observations, regardless of the habitat type were either in or directly adjacent to small grain fields.

The overall habitat status of the Wibaux-Beach study area is fair to poor for Hungarian partridge. Intensive farming in the small grain habitat left little residual and roadside cover. Most Hungarian partridge sightings were associated with wheatfields with nearby brush or windrows. Few of the small grain fields, however, offer this winter and spring cover for the Huns.

TABLE 23

Percentage of Hungarian Partridge Observations by Habitat Type

Creek Bottom	Grassland-Shrub	Small Grain	Grassy Coulee
11.6	8.9	62.8	16.7

Seasonal Use

Hungarian partridge observations were most often made in the small grain habitat type during all seasons except spring (Table 24). When an X^2 test was performed to determine variation of habitat use, significant seasonal variation was found (Appendix 12).

TABLE 24

Seasonal Use of Habitat Types
by Hungarian Partridge

	Fall	Winter	Spring	Summer
Grassland-Shrub	15.1	23.0	100.0	5.7
Creek Bottom	12.3	12.8		48.4
Small Grain	64.4	56.7		36.1
Grass Coulee	8.2	7.5		9.8

Habitat Problems and Conflicts

As farms enlarged and manipulation of the vegetation was more intense, i.e., more native range turned into cropland and few fence rows were left for residual cover, critical spring nesting habitat for the Hungarian partridge was lost. Weigand (1977) suggested that optimum partridge habitat exists in areas of diversified agricultural economics. He explained that a mixture of 34-52% grain, 20-26% fallow, 15-29% range land, 4-12% hayland, 4-5% agriculturally idle areas, and 2% roads, trails and borrow pits provide optimum habitat diversification for "Huns". The percentage of these vegetation types within the small grain habitat of the Wibaux-Beach study area is a far cry from these figures. The average interspersion index for the small grain habitat was 7.8. This illustrates the lack of diversity and, consequently, the low population of Huns in the area.

WATERFOWL

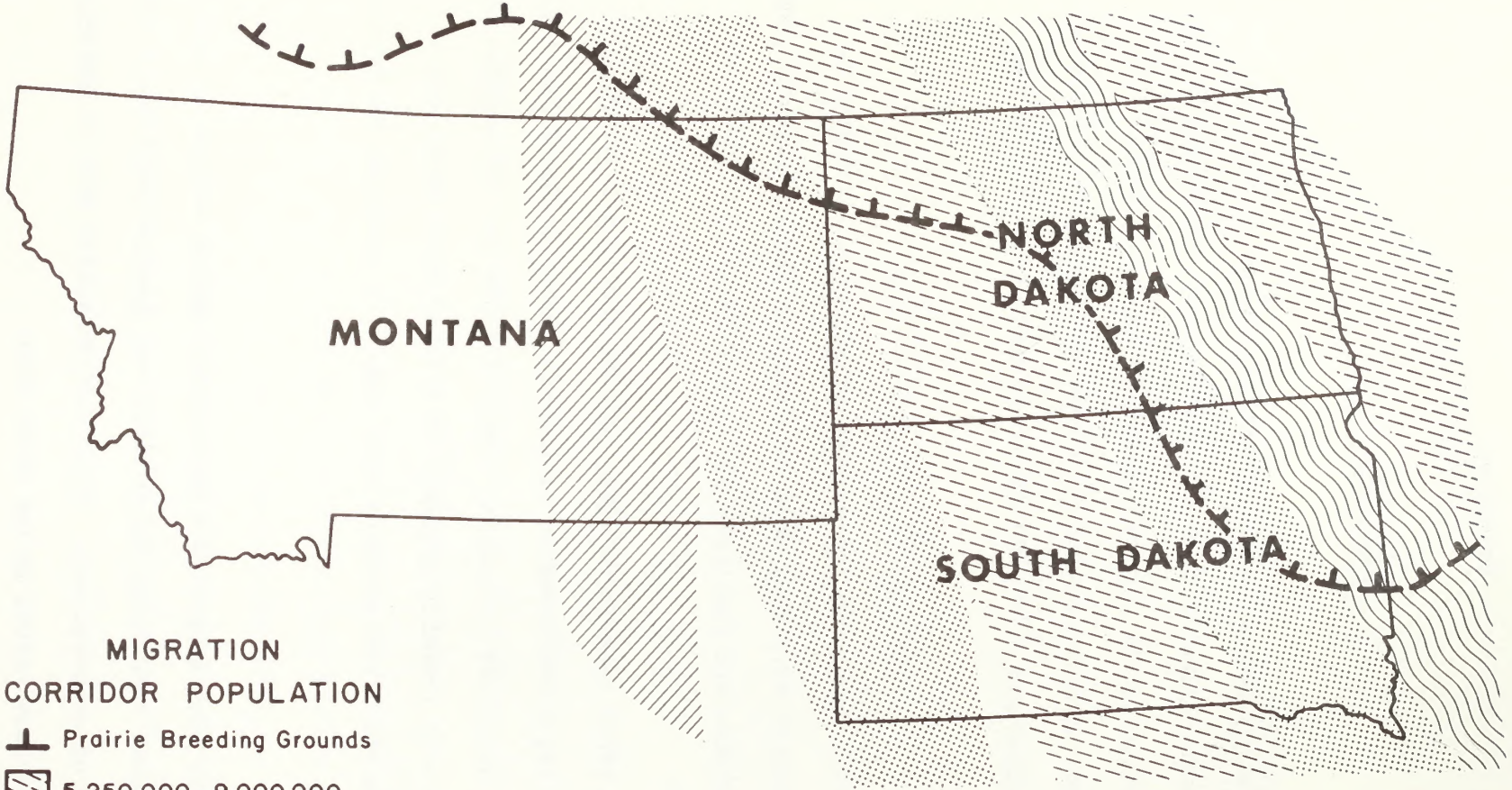
Population

The Wibaux-Beach study area lies within the boundaries of the central flyway. It has been estimated that the breeding population within the United States portion of the central flyway is 7 million ducks. The population of breeding ducks estimated within the flyway in 1978 was 1,440,000 for Montana and 3,015,000 for North Dakota in 1978 (Miller, 1979).

Bellrose (1968,1972) developed the concept of migration corridors to express the passage of waterfowl on a more precise basis. Figures 8 and 9 show these corridors and their population estimates.

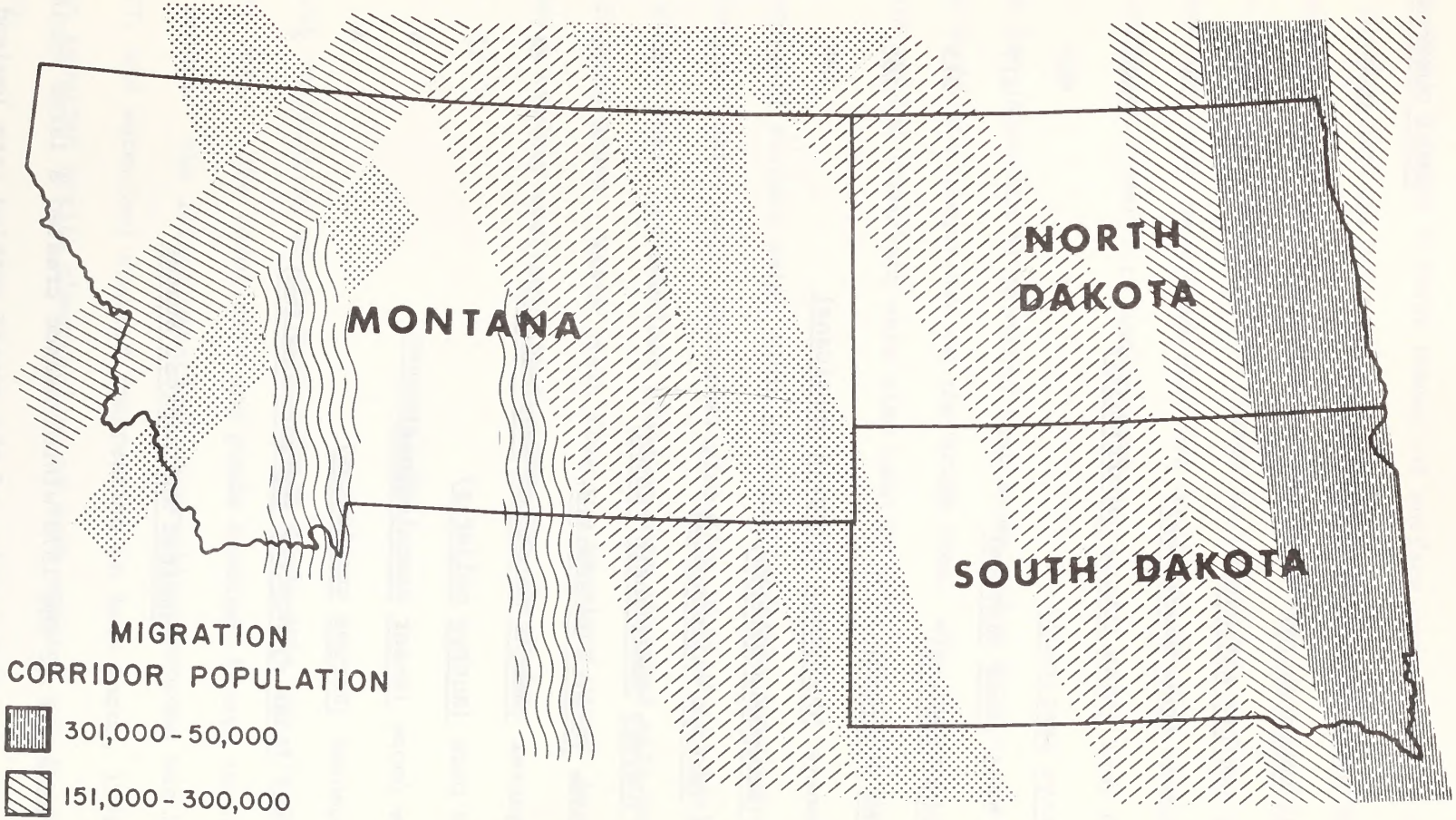
The Wibaux-Beach study area is directly west of the Prairie Pothole Region, the most important breeding grounds for ducks in North America, (See Figure 8). Thousands, of small, temporal ponds dot the surface of this area. This area probably produced 15 million ducks each year at one time, but now about one-third of that number is produced (Bellrose, 1976).

The wildlife study area supported a substantial spring and summer population of waterfowl. The table below lists the species found there and the total number of observations. Those species marked with an asterisk (*) were known to have nested in the study area.



DUCK MIGRATION CORRIDORS

FIGURE 8



GOOSE MIGRATION CORRIDORS

FIGURE 9

SPECIES	Total Observations
Mallard (Anas platyrhynchos platyrhynchos)*	4606
Pintail (Anas acuta acuta)*	2271
Lesser Scaup (Anthya affinis)*	788
American Widgeon (Anas americana)*	740
Green-Winged Teal (Anas crecca carolinensis)*	684
Redhead (Anthya americana)	469
Blue-Winged Teal (Anas ciscors)*	417
Shoveler (Anas clypeata)*	315
Gadwall (Anas strepera)	283
Common Goldeneye (Bucephela clangula americana)	149
Bufflehead (Bucephela albeola)	99
Canvassback (Anthya valisineria)	84
Ruddy Duck (Oxyura jamaicensis rubida)	70
Canadian Goose (Branta canadensis)	59
Common merganser (Mergus merganser americansus)*	44
Ring-necked Duck (Anthya collaris)	15
Lesser Snow Goose (Anser caerulescens)	6
Hooded Merganser (Mergus cucullatus)	4
Cinnamon Teal (Anas cyanoptera septentrionalium)	2

Habitat and Habitat Status

The heavy snowfall of the 1978 winter season created a large spring runoff. A substantial portion of the runoff settled into lowland

depressions in small grainfields or pastures throughout the Wibaux-Beach study area, forming a large number of surface water ponds. Those ponds that existed through May when peak nesting occurs were plotted on Appendix 5. These shallow ponds were frequented primarily by dabbling ducks and geese. Waterfowl observations became less frequent as the surface water receded. By July, waterfowl observed on the study area were associated with permanent reservoirs and streams.

Odland dam (Appendix 5) provided deep water and a food source for the diving ducks and mergansers on the study area. The shallow waters along the bank of the reservoir were also used by dabbling ducks and geese.

The temporary surface water ponds provided important nesting and brooding areas for waterfowl. Mallards, pintails, blue winged teal, shovelers, green winged teal, and american widgeons were observed with broods on these flooded areas. Waste grain from the previous years' harvest provided a readily available food source for the ducks.

Seasonal Use

Waterfowl utilization of the Wibaux-Beach study area was strictly on a seasonal basis. The reservoirs and ponds remained frozen throughout the winter months. The latest waterfowl observation recorded was November 17, 1977, and waterfowl started reappearing in late March, 1978. The earliest recorded spring observations of each species are documented in Table 25.

TABLE 25

Earliest Recorded Spring Observations of Waterfowl

on the Wibaux-Beach Study Area

Species	Earliest Observation
Mallard	3-27-78
Common Golden Eye	3-27-78
Pintail	3-27-78
Snow Geese	3-28-78
Shoveler	3-29-78
Common Merganser	3-29-78
Widgeon	3-29-78
Canadian Goose	3-29-78
Green Winged Teal	3-29-78
Redhead	3-29-78
Bufflehead	3-30-78
Canvassback	3-30-78
Lesser Scaup	4-4-78
Gadwall	4-10-78
Ruddy Duck	4-18-78
Blue Winged Teal	4-19-78
Ring-necked Duck	4-25-78

Habitat Problems and Conflicts

It estimated that the original, natural wetlands of the United States was about 127 million acres. This acreage had dwindled to 75 million acres by 1968, more than one-third was drained for crops or pasture. Further drainage of wetlands has continued at an accelerated pace.

The temporary surface water ponds generated each year from spring runoff were important for nesting waterfowl in the Wibaux-Beach study area. The trend to drain the wetlands was present in the study area as well. As this occurred, less suitable nesting and brooding habitat was available.

COLONIAL NESTING BIRDS

(Cranes, Cormorants, Herons, and Pelicans

Sandhill Cranes

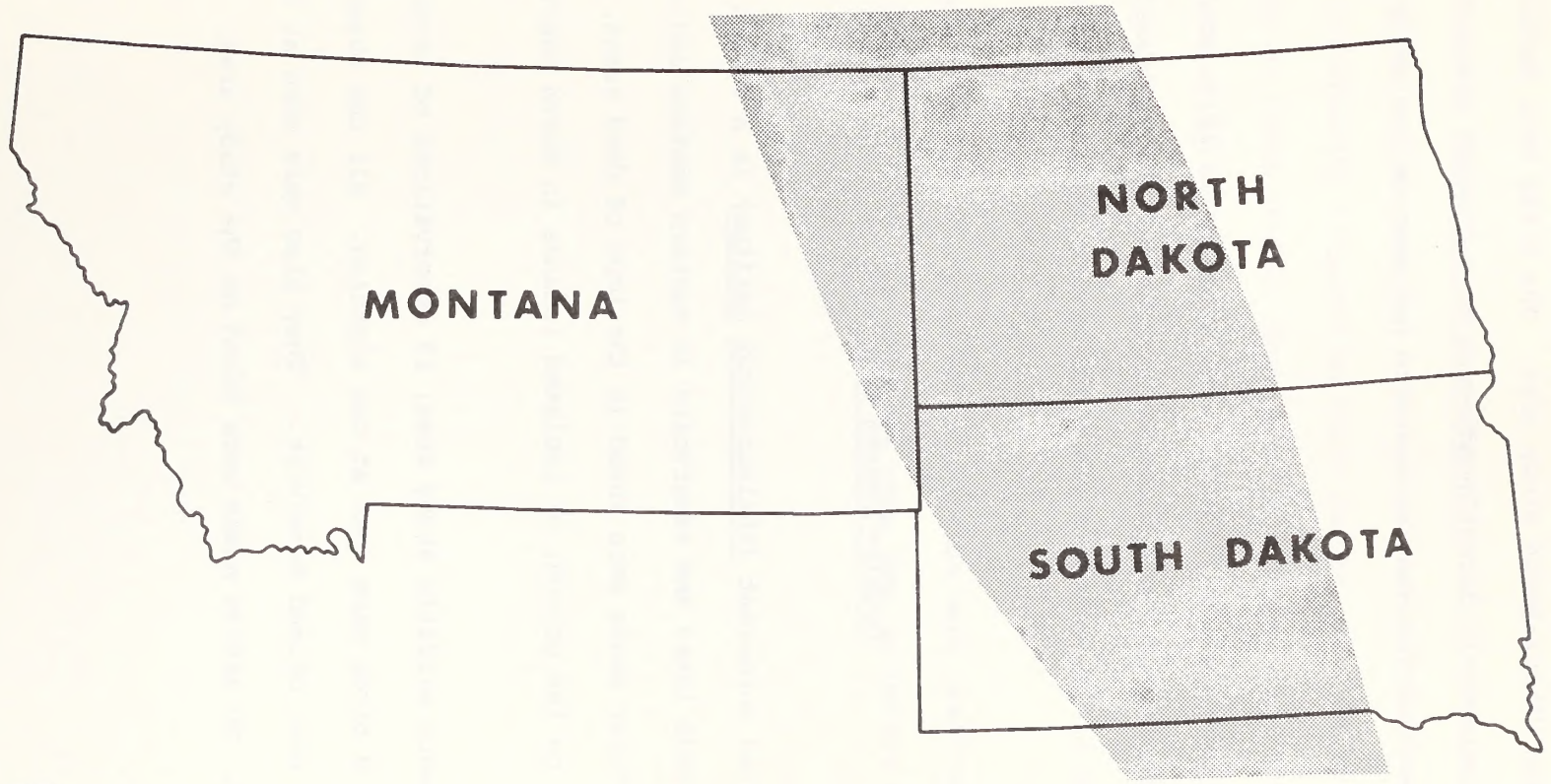
The Wibaux-Beach wildlife study area lies within the migration corridor of the lesser (Grus canadensis canadensis) and Canadian (G.c. rowan:) sandhill cranes (See figure 10). From population estimates along the Platte River staging area in Nebraska, a minimum of 200,000-270,000 lesser and canadian sandhills are found each spring. (Lewis, 1977).

Although the study area was not designated as a major staging area for the spring, several thousand cranes were observed feeding and nesting in small grain fields near temporary ponds.

The first observation of the migrating sandhills was March 29, 1978. Similarly. large flocks were observed during their migration to wintering grounds in the fall. They were first recorded on October 30, 1977, flying south.

Whooping Cranes

At the last census, 74 whooping cranes existed in the Wood Buffalo/ Aransas population (U.S.F.W.S., 1979). The whoopers were integrated with sandhill cranes in the Gray's Lake, Idaho population and Wood Buffalo, Canada population with some success.



Source: Federal Register, 1978

SANDHILL CRANE MIGRATION CORRIDORS

FIGURE 10

On April 3, 1978, 2 whopping cranes were observed at T.13N., R.60E., Section 13 on the Wibaux-Beach study area. The birds were feeding in a small grain stubble field directly adjacent to a flooded grain field. The whoopers remained for one day and were not seen on the study area again.

A further investigation in late March and early April, 1979, would provide important data to determine whether this area is a traditional resting area and if the previous years' offspring, if any, also visited this area.

Double-Crested Cormorant

The double-crested cormorant (Phalacrocorax auritus) is a common colonial nesting bird around lakes and reservoirs in eastern Montana and western North Dakota. Their nests were found in the tops of dead trees, primarily cottonwood, or on the ground, or isolated islands in North Dakota.

In the Wibaux-Beach wildlife study area, 15 observations of cormorants were made. Only 9 birds were seen at one sighting. All the observations were made on or near Odland Reservoir. They also were seen at Old Lodge Reservoir. No active nests were found on the study area.

Pelicans

The white pelican (Pelecanus erythrorhynchos) are a common colonial nesting bird throughout eastern Montana and western North Dakota. Large flocks of non-breeding pelicans in North Dakota can traditionally be found at the J. Clark Salyer, Upper Souris, and Des Lacs National Wildlife Refuges during the breeding season. The breeding colonies were usually restricted to isolated, sparsely vegetated islands in large lakes or reservoirs (Stewart, 1975).

At the Wibaux-Beach study area, white pelicans were observed only one time. On April 10, 1978, two pelicans were seen on Odland Reservoir.

OTHER SPECIES

Prairie Dogs

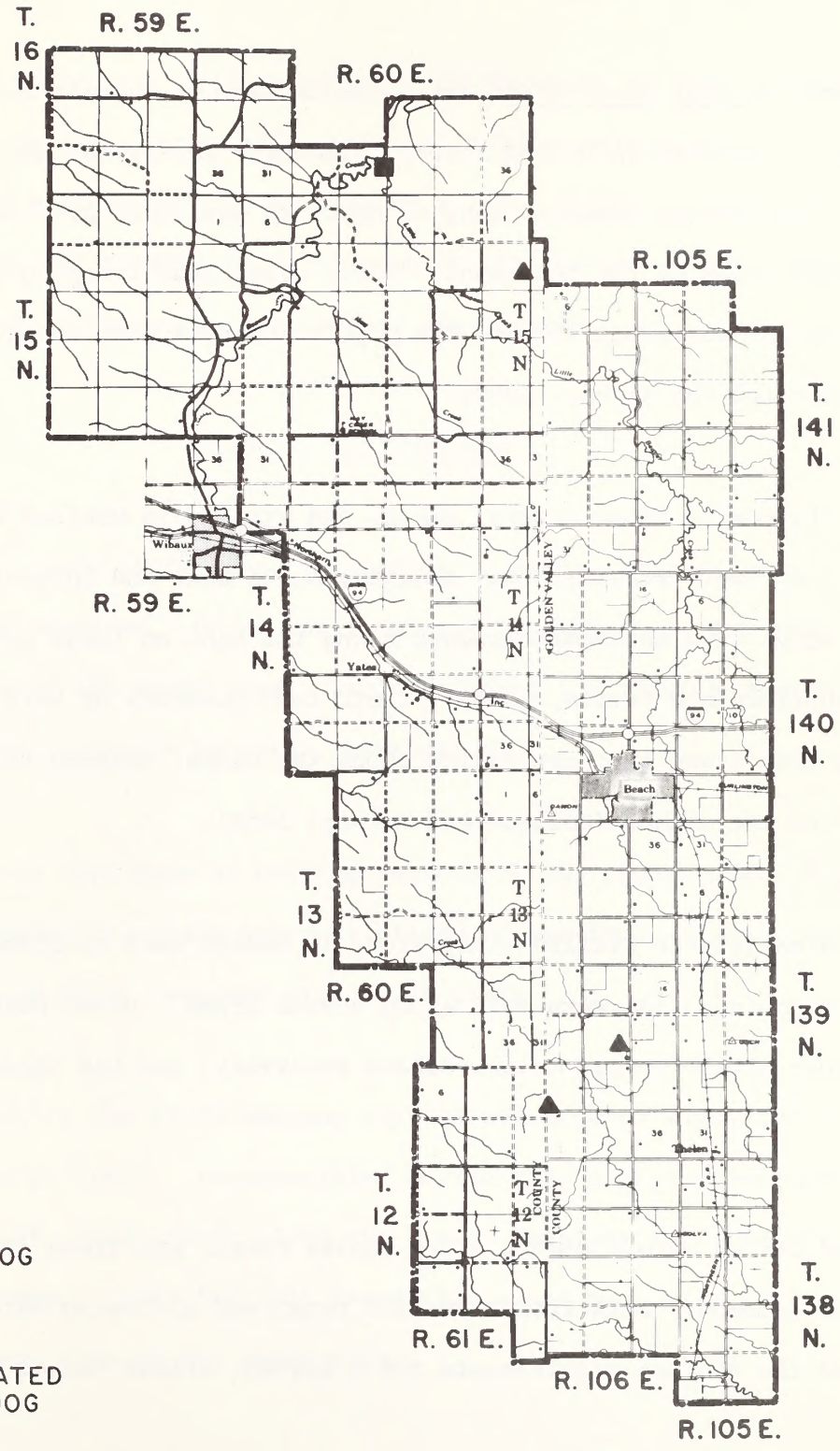
In the past, most black-tailed prairie dog studies were made to assess the damage incurred to other resources. Extensive poisoning and pest control programs were undertaken to control the prairie dogs depredation upon the existing vegetation.

More recently, the prairie dog gained considerable interest with reference to black-footed ferret habitat.

The Wibaux-Beach wildlife study area supported only a very small population of prairie dogs. Figure 11 illustrates all prairie dog observations. The largest "town" recorded was less than 2 acres in size.

Mr. Zane Wood, a local rancher, made reference to a fairly large town that once existed in T.16N., R.60E., Section 33, at the mouth of Little Beaver Creek. This town was poisoned out approximately 15 years ago.

The small grain habitat area possibly supported dog towns in the past. Theodore Roosevelt National Park approximately 30 miles east of the Wibaux-Beach study area, has similar soil and vegetative characteristics and supports several prairie dog towns.



PRAIRIE DOG OBSERVATIONS

FIGURE II

Beaver

The beaver (Castor canadensis) has played an important role in the history of the western United States. The high demand for the pelts in the east and Europe enhanced many trappers to move into previously unexplored areas of the continent. Their relentless trapping extripated the beaver or seriously reduced its population over much of its native range (Holland and Kelsor, 1959).

Beaver are common along rivers, lakes, and streams in Montana and North Dakota. On small streams, they commonly build dams and lodges; however, beaver often live in holes burrowed along the bank on large rivers and lakes (Hoffman and Pattie, 1968). Their food consists of bark and cambium from trees that are felled along the banks, dragged to water and floated to the caches (Holland and Kelsor, 1959).

On the Wibaux-Beach widlife study area, 16 beaver were observed. Most of the sightings (13) were made along Beaver Creek. Other beaver were seen along Little Beaver Creek, Odland Reservoir, and Old Lodge Reservoir.

Dams and caches were abundant along Beaver Creek, and fresh cuttings were also common. Bark from trees and brush and a flowing water supply provided the habitat requirements for a strong, stable beaver population.

Merriam's Turkey

Wild turkeys (Meleagris gallopavo) were not found on the Wibaux-Beach study area. In the Spring, 1978, however, a local Wibaux area rancher released four turkeys in the vicinity of T.16N., R.60E., Section 27. They were observed several times throughout the spring and early summer. Their survival and reproductive success was unknown.

Raptors and Vultures

On the Wibaux-Beach study area, 13 species of hawks, falcons, eagles and vultures were observed. Marsh hawks (Circus cyaneus) were the most common raptor of the study area. Table 26 lists the species seen and their relative abundance by total observations.

No observations were made of nesting raptors on the study area. This does not, however, preclude any possibility of nesting. Juvenile hawks and eagles were often observed with adult birds.

Available habitat for cliff-nesting raptors was located along the eastern border of Beaver Creek. Inaccessible, barren clay buttes, some upwards of 30 feet high, were common along the creek. Habitat for tree nesters was not as common. Very few tall trees that would provide a suitable spot for a nest were on the study area.

TABLE 26

Raptor and Vulture Observations
of the Wibaux-Beach Study Area

Species	Total Observations
Marsh Hawk (Circus cyaneus)	110
Kestrel (Falco sporverius)	42
Swainson's Hawk (Buteo swainsoni)	31
Red-tailed Hawk (Buteo jamiacensis)	21
Ferruginous Hawk (Buteo regalis)	18
Prairie Falcon (Falco mexicanus)	12
Bald Eagle (Haliaectus leucocephalus)	7
Golden Eagle (Aquila chrysaetos)	6
Pigeon Hawk (Falco columbarius)	3
Rough-legged Hawk (Buteo lagopus)	2
Sharp-shinned Hawk (Accipiter striatus)	2
Cooper's Hawk (Accipiter cooperii)	2
Turkey Vulture (Cathortes aura)	2

SUMMARY AND DISCUSSION

The Wibaux-Beach wildlife study area supported a large and diverse species of animals. The variety of vegetation provided the habitat necessary for many of the popular game species of eastern Montana and western North Dakota.

The central focus of the study area was Beaver Creek and its surrounding vegetative community. The creek bottomland was vital to wildlife for the entire area. The greatly diversified and interspersed vegetation in the creek bottom habitat provided the necessary food and cover for strong, productive whitetailed deer, and pheasant populations. Agricultural practices were such that the woody vegetation along the creek was left intact and the small, uneven, adjacent hay and small grain fields created even more interspersion, enhancing the edge effect.

During spring runoff, a large number of temporary ponds were created, much similar to the prairie pothole region. These wetlands provided excellent nesting, feeding and brood-rearing areas for waterfowl and shorebirds. The study area was within the migration corridor of the sandhill crane, and large flocks of sandhills were often observed around the wetlands during spring. A pair of endangered whooping cranes were also observed on the wetlands.

The native grasslands in the study area were an important area for sharptailed grouse. Sixteen dancing grounds were found. The charac-

teristic rolling, grassy hills broken up by woody draws provided excellent food, cover, nesting, brood-rearing, and courtship habitat for the sharptails. This was also a common area for mule deer, and whitetails were often found along the woody draws in the springtime.

Farm practices made it profitable for turning much of the native grass prairie under for wheat and barley production. As this occured, important habitat for sharp-tailed grouse and mule deer was lost. Little woody cover was found in the agriculturally intense areas of the eastern and southern portions of the study area. Food was inaccessible to wildlife species during the winter months as the snow deepened. Most wildlife observations made in the small grain habitat during winter months were associated with the few windrows or shelterbelts found in the area.

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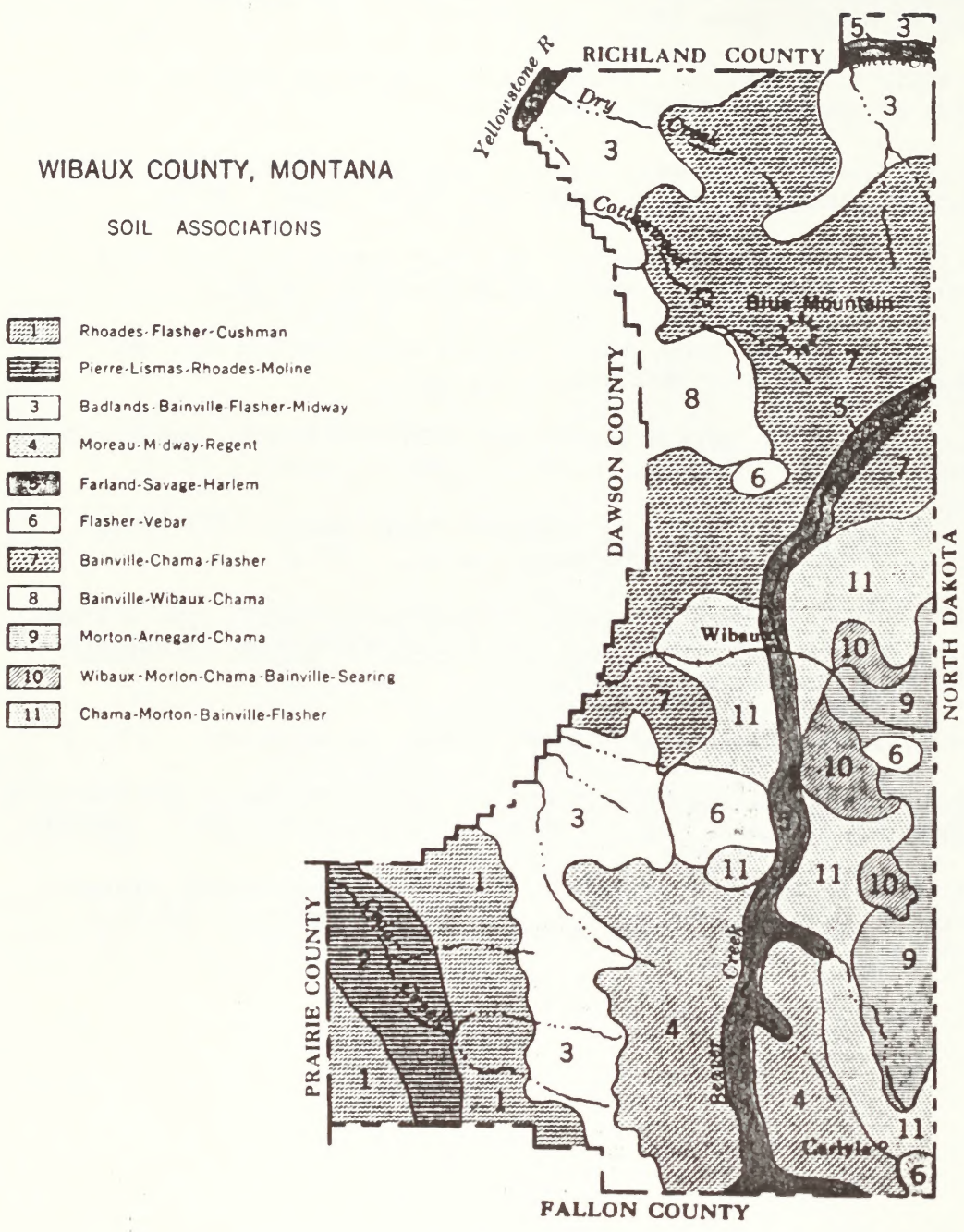
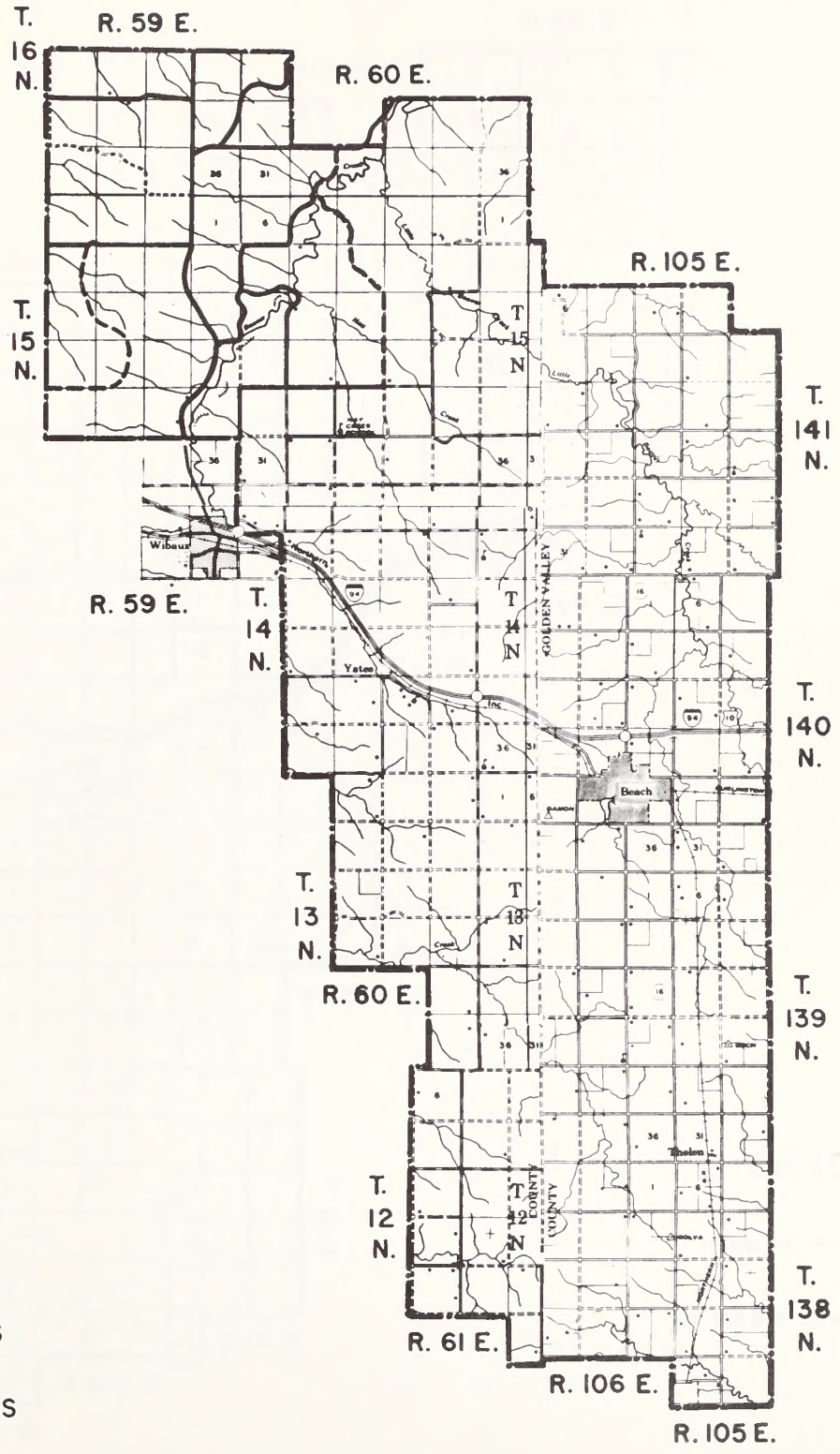


APPENDIX 1. Soil Association Map of Wibaux County, Montana (From S.C.S. Soil Survey 19).



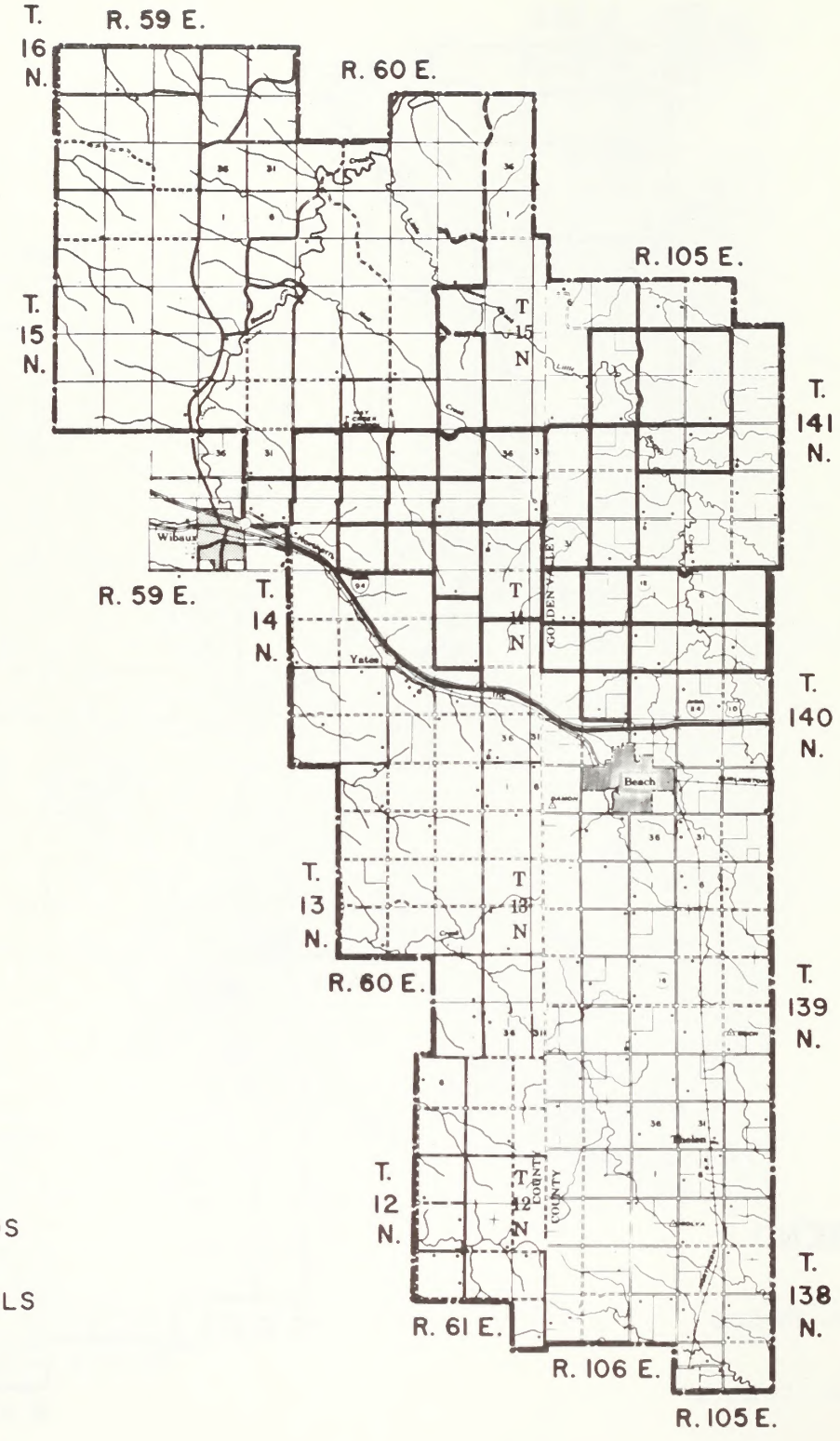
LEGEND

——— ROADS

---- TRAILS

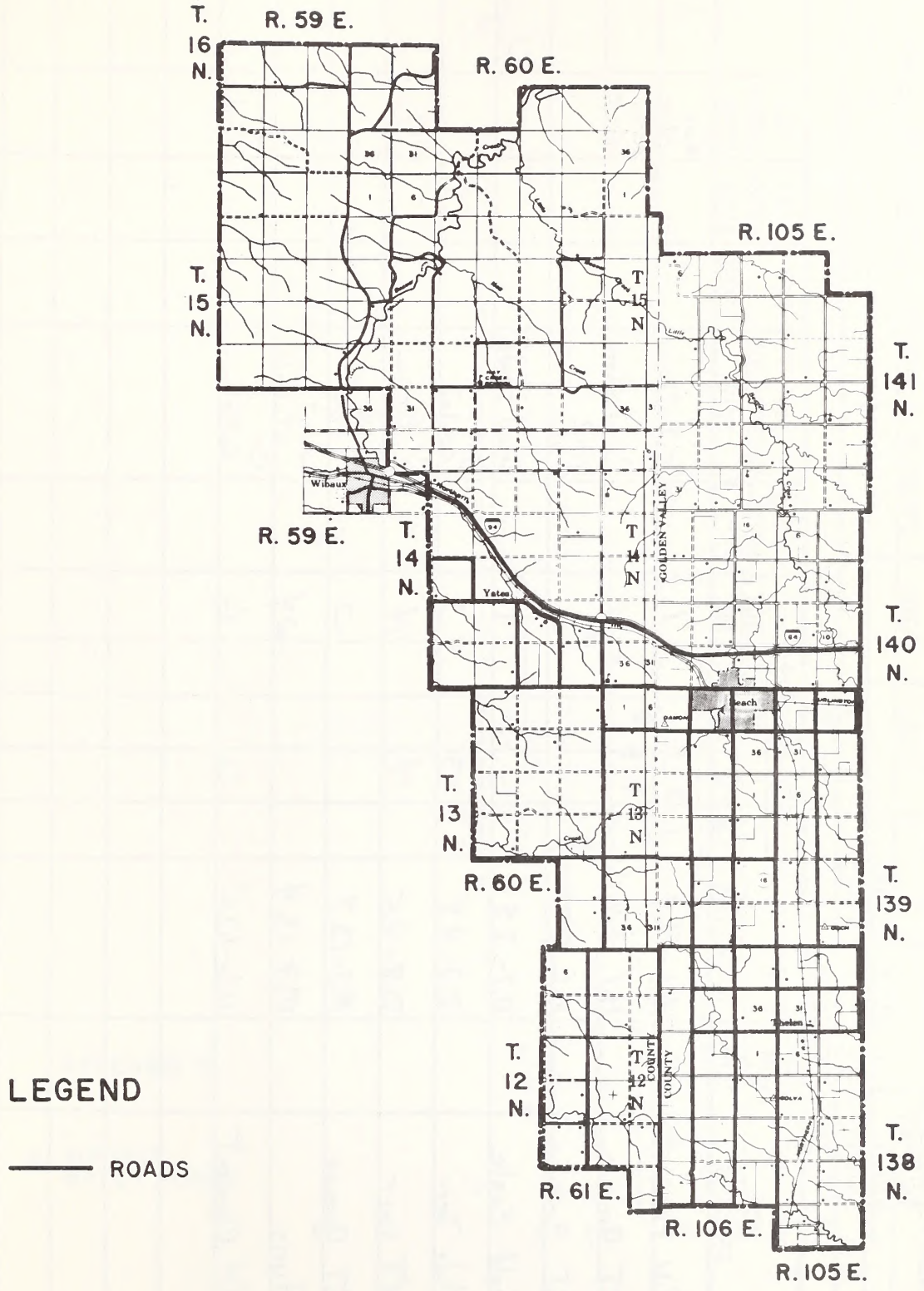
ROADS AND TRAILS USED FOR OBSERVATION ROUTE 1

APPENDIX 2A



ROADS AND TRAILS USED FOR OBSERVATION ROUTE 2

APPENDIX 2B



ROADS AND TRAILS USED FOR OBSERVATION ROUTE 3

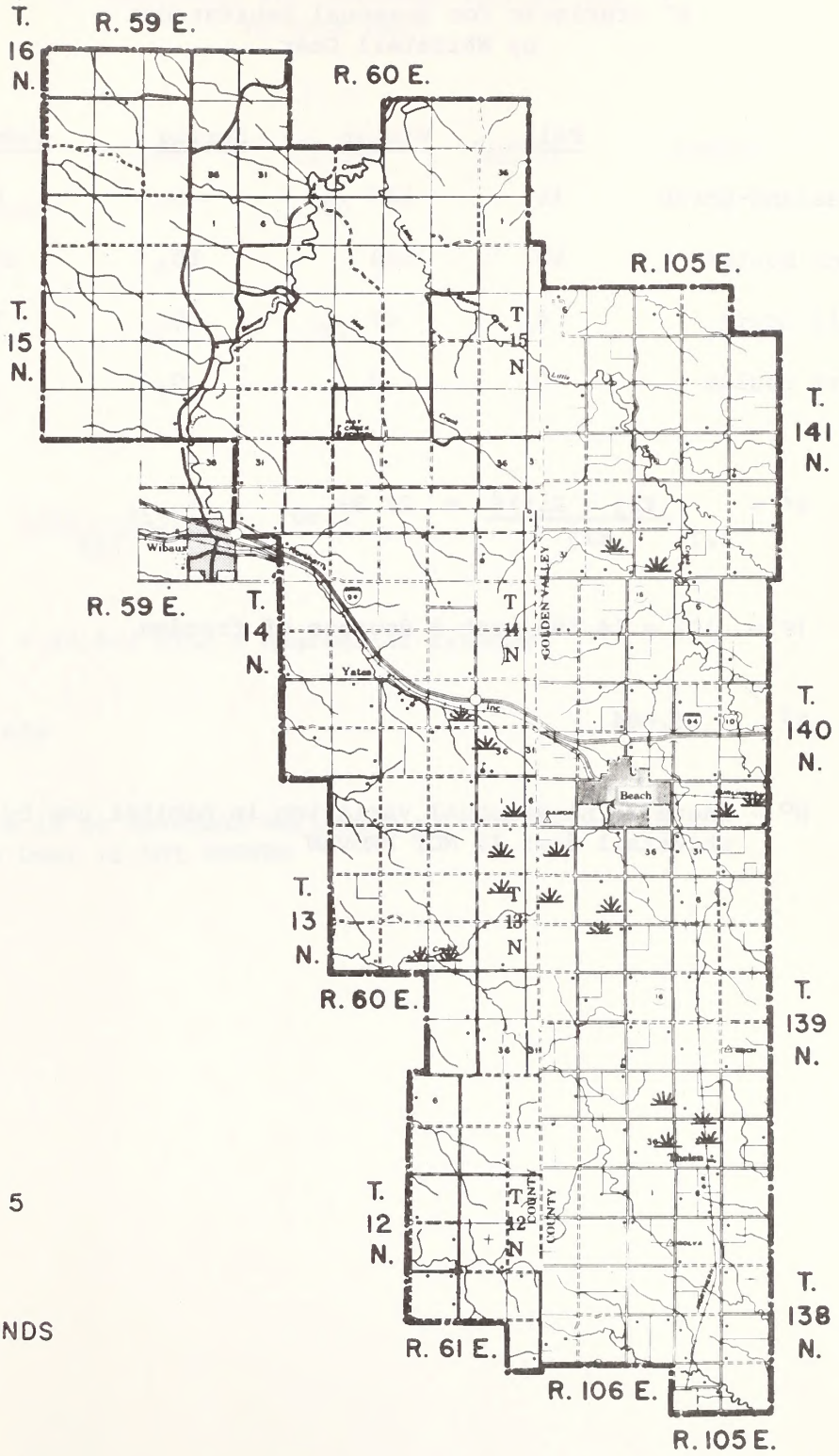
APPENDIX 2C

APPENDIX 3. Sample Wildlife Observation Form

WILDLIFE OBSERVATION DATA SHEET

DATE	Nov. 30. 77	SUNRISE		WEATHER:	(A) CLOUD COVER	GROUND COND.	(C) PRECIP-ITATION	TEMPER-ATURE	(D) WIND DIRECTION	(E) WIND VELOCITY	ROUT MILEAGE
PROJECT		SUNSET									
OBSERVER	J.M.	PAGE	1 OF 1	START							
AREA		ROUTE =	B C	FINISH							

OBSERVATION NO.	(F) TYPE	(G) SPECIES	A.M. TIME	LOCATION	SEX AND AGE ♂	♀	YNG	UNK	TOT. NO.	(H) ACTI-VITY	(I) VEGETATION TYPE	(J) SLOPE	(K) EXPO-SURE	(L) SHRUB DENS.	REMARKS
		R.N. Pheasant		H.1 - 9.9	1				1		Cr Bottom			Rus. olive	
		ST Grouse		H.1 9.9					1		Cr Bottom			Rus. olive	
		ST. Grouse		M.7- 7.7					2		wind row				
		Gold Eagle		D.7- 7.8					1		wheat stubble				Flying
84		Mule Deer		D.7- 9.8		3			3		grassy coulee				
		WT Deer		D.8- 9.5		14			14		Cr. Bottom			Hay stack	
		ST Grouse		M.7-13.7					2		wind-row				
		Huns.		M.9-13.4					24		wheat stubble				
		RN Pheasant		D.6-10.5		6			6		Cr. Bottom			wheat stubble	



APPENDIX 5

SURFACE WATER PONDS

APPENDIX 6

X^2 Statistic for Seasonal Habitat Use
by Whitetail Deer

	Fall	Winter	Spring	Summer
Grassland-Shrub	31	107	1	60
Creek Bottom	50	563	15	200
Small Grain	4	47	0	16
Grass Coulee	0	0	0	0

$$X^2 = \sum_{i,j} \frac{(Yij - Eij)^2}{Eij} = 26.39$$

(P = .10) = 14.684 with 9 degrees of freedom

X^2 14.684

H^o - There is no seasonal variation in habitat use by whitetail deer IS NOT PROVEN

APPENDIX 7

X^2 Statistic for Seasonal Habitat Use
by Mule Deer

	Fall	Winter	Spring	Summer
Grassland-Shrub	3	50		9
Creek Bottom	4			4
Small Grain	55	261	8	10
Grass Coulee	9	0	0	0

$$X^2 = \frac{(Yij - Eij)^2}{Eij} = 108.1$$

(P = .10) = 14.684 with 9 degrees of freedom

X^2 14.684

H^O - There is no seasonal variation of habitat use by Mule Deer IS NOT PROVEN

APPENDIX 8

X^2 Statistic for Seasonal Habitat Use by Antelope

	Fall	Winter	Spring	Summer
Grassland-shrub	43	8	5	70
Creek Bottom	0	0	0	0
Small Grain	54	45	1	28
Grass Coulee	0	14	0	3

$$X^2 = \sum_{i,j} \frac{(Yij-Eij)^2}{Eij}$$

$X^2 = 70.7$

$(p= .10) = 14.684$ with 9 degrees of freedom.

X^2 14.684

H^o There is no seasonal variation in habitat use by Antelope - IS NOT PROVEN.

APPENDIX 9

X^2 Statistic for Seasonal Habitat Use
by Ring-Necked Pheasants

	Fall	Winter	Spring	Summer
Grassland-Shrub	126	49	11	152
Creek Bottom	109	261	57	240
Small Grain	25	22	0	14
Grass Coulee	8	11	0	0

$$X^2 = \sum_{i,j} \frac{(Hij - Eij)^2}{Eij} = 128.1$$

(p = .10) = 14.684 with 9 degrees of freedom

X^2 14.684

H^o - There is no seasonal variation in habitat use by ring-necked pheasant IS NOT PROVEN

APPENDIX 10

X^2 Statistic for Seasonal Habitat Use by Sharp-Tailed Grouse

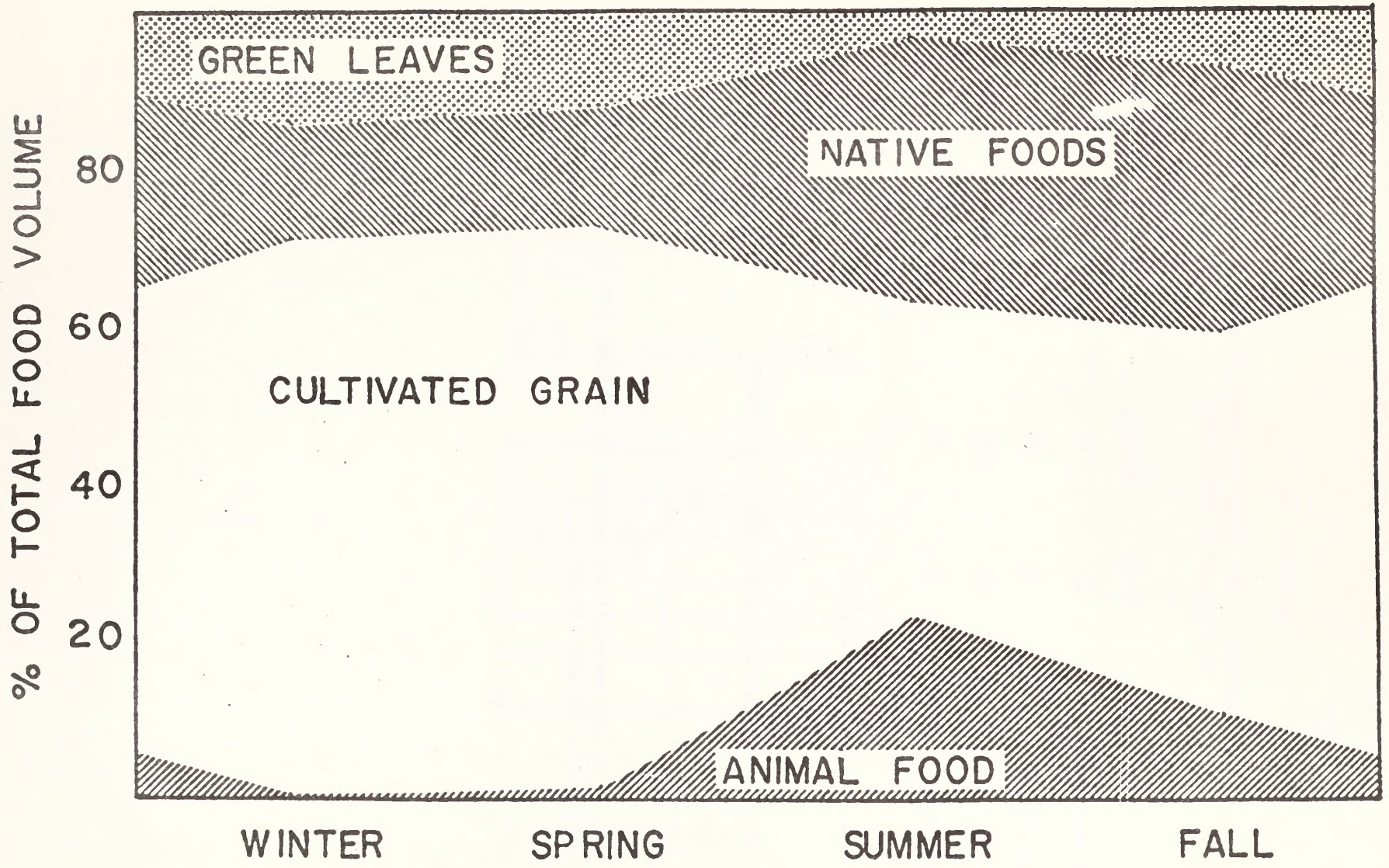
	Fall	Winter	Spring	Summer
Grassland-Shrub	58	5	0	172
Creek Bottom	14	32	17	119
Small Grain	78	20	0	14
Grass Coulee	8	0	0	0

$$X^2 = \sum_{i,j} \frac{(Yij - Eij)^2}{Eij} = 229.2$$

(p = .10) = 14.684 with 9 degrees of freedom

X^2 14.684

H^o - There is no seasonal variation in habitat use by sharp-tailed grouse IS NOT PROVEN



Composition of annual diet of Hungarian partridge in North Dakota.

APPENDIX 11. (From G. D. Kobriger. Foods of the Hungarian Partridge, In Perdix, 1977).

APPENDIX 12

X^2 Statistic for Seasonal Habitat Use
by Hungarian Partridge

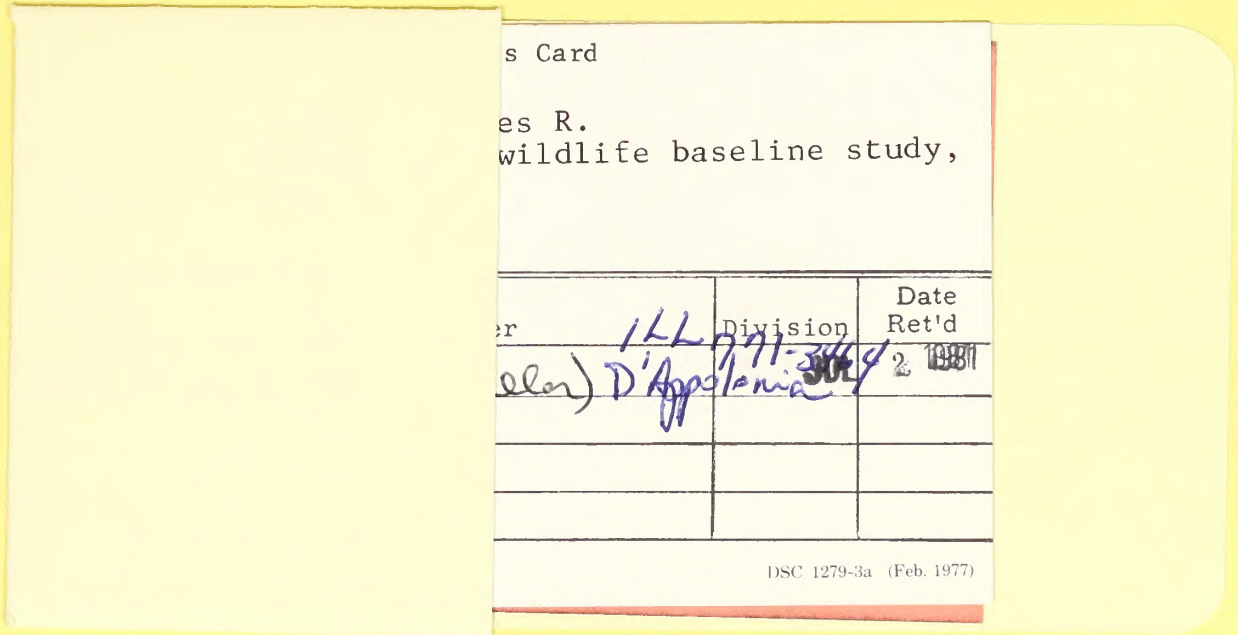
	Fall	Winter	Spring	Summer
Grassland-Shrub	11	43	2	7
Creek Bottom	9	24		59
Small Grain	47	106		44
Grass Coulee	6	14		12

$$X^2 = \sum_{i,j} \frac{(Yij - Eij)^2}{Eij} = 78.4$$

(p = .10) = 14.684 with 9 degrees of freedom

X^2 14.684

H^o - There is no seasonal variation in habitat use by Hungarian partridge IS NOT PROVEN



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